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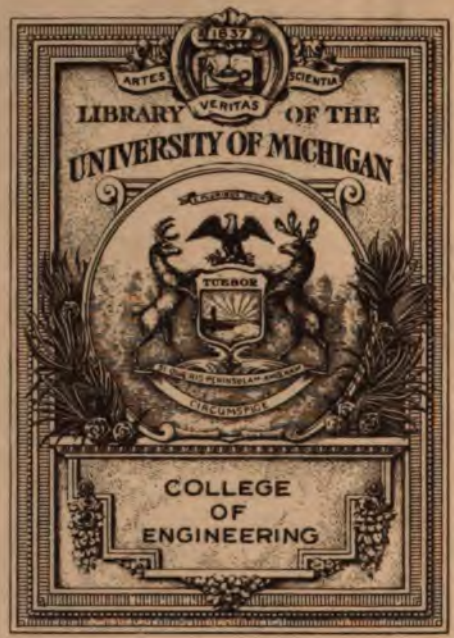
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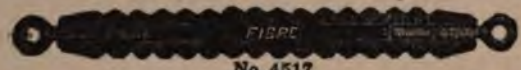

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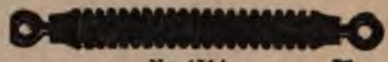

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U. S. S. MAINE.

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A MIDSHIPMAN ON THE *MAINE*

By COMMANDER W. T. CLUVERIUS, U. S. Navy

FOREWORD

This is a midshipman's story of the ill-fated *Maine*. It was written on the Santiago Blockade during the Spanish-American War and only a few months after the ship's destruction. His record has come to light from the bottom of a chest of old papers and he wrote as he felt, while the scenes were yet fresh in his mind's eye. The good ship and her stalwart crew have never been forgotten in the navy even though the twentieth anniversary of that dread night is now at hand.

The North Atlantic fleet had arrived at anchor off Dry Tortugas on a delightful January evening, when the commanding officer of the battleship *Maine* received orders to proceed with his command to the city of Havana.

At last, after a month of false alarms and tiresome lingerings in southern waters, an American warship was starting for Cuba.

Some of us aboard considered it our good fortune, and others, while glad of the change, felt many misgivings within. We had been waiting since October, when, with hurry-up orders, we were sent to Port Royal, in South Carolina; then, after six weeks, a change of orders took us to the Norfolk Yard for Thanksgiving; and, finally, we hastened to Key West, there to remain until the fleet came South, whiling away the time in pursuit of filibusters and mosquitoes—both giving us much trouble.

Howbeit, January 25 dawned "clear and pleasant," and on the starboard bow stretched the deep blue line of the Cuban coast.

Steaming very slowly, every preparation was made for any possible emergency. The question was: Had or had not the consul-general asked for a warship?

The main and secondary batteries were supplied with ammunition, the guns themselves carefully examined and put in the best shape; rifles were brought from the armory, rifle belts filled with cartridges; the necessaries for a landing force gotten in readiness. When still well outside the Morro, we went to general quarters.

American vessels were not usually taken unawares. We approached from the westward, the pilot boarded us, and slowly the good ship *Maine* entered the narrow channel—the first naval vessel to do so since the outbreak of the prevailing struggle for Cuban freedom.

On the starboard hand, La Punta battery displayed its antique artillery, and beyond towered the Castillo de Principe. On the port hand was the Morro, imposing in its ancientness, built up from the jagged rock on whose extremity stands the lighthouse which marks the entrance. Far up on the battlements floated the yellow and red of Spain. On past the Morro, along the heights, stood the fortress of Cabañas, the lodgment of those Americans who had persisted in the art of filibustering and whose efforts had not met with success at Spanish hands. Just below Cabañas, on the hillside, was the laurel grove where doomed insurgents were shot; and further down, on the water's edge, was the town of the Casa Blanca, where colliers were being unloaded from piers.

Passing by the large German frigate *Gneisenau*, lying at anchor, the *Maine* arrived, without event, at the mooring buoy designated by the captain of the port. This was a government buoy—No. 3—placed just off the Machina de San Ferdinand, the naval station. At another one of the buoys, the next to the northward, lay the *Alfonso XII*, a cruiser, the flagship of Rear Admiral Manterola.

At 10, the port was saluted and Cabañas returned the salute. Then we saluted the Spanish admiral and the *Alfonso* answered. A boarding officer shortly afterwards made the usual visit to us. Crowds of people lined the wharves along the entire city front, house tops were full, and the boatmen were doing the best business of the season.

Spaniards and Cubans are not naturally quiet, and the noise of the jabbering—the term seems justifiable—was plainly heard on our quarter-deck. The harbor was crowded with vessels. Across the way, off Regla, were the liners taking cargo from lighters; up

the harbor a bit were two or three small gunboats. Near Casa Blanca was moored the large dry-dock brought from England.

At the docks were the transports loading with troops for other points on the island.

No doubt the coming of the *Maine* had created a stir and set all the tongues of the populace going.

"So that's the best ship in the Yankee navy!" said one sneeringly.

"Why," remarked another of the loyal worthies on the docks, "put her on the quarter-deck of the *Carlos V* and you couldn't find her."

"If the *Palayo* ever got after her!" exclaimed a third. The Cubans, though, felt proud of the arrival of the *Maine* and took the meaning of it to themselves.

An officer was sent to call on General Lee reporting the arrival and, also, that the salutes had been exchanged and the official visits made.

I chanced to be the one sent to the consulate, and was put ashore at the Machina. At the gates to the street were throngs of people peering through at the American boat. Followed by a crowd of urchins and idlers I reached the Casa Nueva, in which are located both our own and the British consulates. The general received me and seemed much surprised at our early arrival. I could see that he did not expect a ship—at least, not just then.

"Was there any disturbance on your way in?" he asked. "None," said I. Again he looked surprised, and arranging the hour for Captain Sigsbee's visit I withdrew. With the same band of followers, augmented, perhaps, by a few more negroes, my *cabriolé* soon reached the Machina where the boat awaited me.

Not until after all the official visits were made, were the officers allowed to go ashore. Captain Sigsbee and his aid, Midshipman Holden, called on the admiral at his residence in the Machina; then on the acting captain-general of the island, General Parrado. Blanco, at that time, was in the Province of Santa Clara attempting to buy over the Cuban leaders in the east.

General Parrado received the captain with much courtesy and promised to return the call next day. What with all these official obligations devolving upon Captain Sigsbee, it was some time before he found himself able to pay his respects to that august body of the Cuba-Española, the Autonomist Cabinet, whose dignity

was considerably ruffled when the American naval officer failed to do homage the very first hour of his arrival!

The second day in port, during the forenoon, General Lee —jovial as always—came on board with a party of Americans and Cubans, and a cordial greeting followed. The next day, General Parrado and staff arrived alongside in the official launch. They were received by the captain and officers, and the marine guard was paraded. General Lee accompanied the party, his civilian clothing forming a great contrast to the gaudy array of the Spanish staff-officers. Not one single uniform matched another. Some wore red coats, light blue trousers with green stripes; some, blue coats, red trousers with black stripes; others wore green coats, red trousers with blue stripes—for all the world like the "soldiers-so-brave" in the comic opera of the period.

The acting captain-general, seemingly a very able man, inspected the ship from top to bottom. Some of his officers looked rather dubious, when, at the entrance of the long armor-passage, we desired them to pass through.

There was no telling what those Americans would not do.

Parrado was much pleased with the *Maine* and expressed his satisfaction the following day by presenting the officers' messes with the best sherry his cellars contained.

Soon the visiting populace began to pour in upon us, from the early forenoon until dark every day. Large parties of Cubans—pretty girls, enthusiastic young men, scolding duennas, and crying children—crowded aboard. And all the while Spanish boatmen, struggling for the gangway, made such a hubbub, that the sentry's order to "move off" or "get out of that" was not heeded. These fellows would hang on to the boats at the booms, to the pendants, to the ash-chute, to ring-bolts anywhere to be able to keep from pulling one whit more than absolutely necessary. The bluejackets enjoyed it all hugely, and, as only one or two spoke Spanish, those acting as guides used the sign language mingled with sea-going terms and strong English expressions. A party would gather around one as he opened the breech of a six-inch gun. He would go through the acts of loading, training, and aiming, then the meaning would dawn on the audience and a "Si! Si! Si!" was passed around, and the entire party would put on a broad smile of admiration as the demonstrator took a fresh chew.

No visitors were allowed below the main-deck unless accompanied by one of the crew detailed by the officer of the deck. This rule was strictly enforced at all times. The chief master-at-arms, with his assistants and the marine sentries kept a constant patrol on the berth-deck and below. Now and then a Spanish officer was seen amongst the visitors, and sometimes a group of soldiers appeared; but they, poor unfortunates, did not know a turret from a capstan.

From time to time we saw the big transatlantic transports come in laden with raw troops, most of them mere boys. Then the city went wild, rockets fired, flags flying, ferry-boats leaving their route and circling around the steamers for hours, with brass bands hammering out "Cadiz" over and over, and the passengers yelling themselves hoarse with cries of "Viva Cuba-España!—Viva La Autonomiste!" Later on the troops would be removed, some sent to the front at once, some to Cabañas, and others to the arsenal up the harbor.

Another German vessel arrived—the *Charlotte*—and anchored near by. Soon the French flagship *Dubordieu* came in and anchored near us, making a very pleasant neighbor.

Shore leave was granted the officers a few days after our arrival and we were ordered to wear civilians' dress ashore at all times. Popular feeling, we soon found, was decidedly against us and against the maintenance of an American warship in the harbor of Havana. The Cubans, whose acquaintance we had made on board, extended hospitalities, and regretted very much their inability to entertain us as they wished, through fear of the annoyances and friction this would cause with the authorities. In other words, to be seen publicly with an officer of the American navy, meant to be marked as an insurgent sympathizer.

Of course, we met many Cuban-Americans. The majority were delightful, polished persons. Others were American in name only, and had but little contact with our own people and our own customs. The greater bulk of the populace were Cubans. The Spanish troops—a very transient portion of the inhabitants—in and about the city were numbered by the thousands. There were officers everywhere.

The cabmen, the boatmen, the public servants, the hotel employees, and above all, the shopmen, were Spaniards. The Cubans we met were for the most part property owners, and, before the

war, maintained their large sugar estates, so lived in a certain amount of luxury. The effects of the war on their interests were, first, to compel them to pay a heavier tax to the Spanish Government; and, besides, to make a like compensation to the insurgents to be allowed to grind their own cane. Finally, the Cuban estates were closed entirely, many of them burned, so that the only plantations doing a profitable business in the Island of Cuba were those controlled by American interests.

The representative Cubans—I mean those upon whom the duties of governing free Cuba ought by right devolve—directly and indirectly helped the insurgent cause. There were members of the best families in arms throughout the island. Yet, I have heard many Cubans say—some of their best minds too—that annexation to the United States would be the only solution of the problem, the only means of securing the permanent welfare of the people at large.

These, our friends, while they rejoiced to see the *Maine* at anchor off the city, often told us that they were not entirely at ease as regards our safety in those waters. Spanish treachery to them was an every-day affair. They saw it in the every act of the Spaniard, and naturally apprehensions for our well-being arose.

The greatest element of disturbance in Havana society was the Spanish soldier. Should you chance to join that great throng of promenaders in the Parque Central, as the band played about the base of the statue of Isabella La Catolica, your first thought would be—Where did all those Spanish officers come from? They outnumbered the civilians, and, in their comfortable colonial uniform, took possession of the promenade. One rarely saw a Cuban girl in these gatherings at that time.

The Spanish naval officer was more or less countenanced by the Cubans and was often received in their homes. Those I met were bright, courteous people. Yet even as the officers of the army were not obliged to remain with their troops in the various garrisons about the city, no more were the officers of the navy compelled to live altogether aboard ship. Their naval academy training profited them little, it seems, especially on the Cuban station. Drills and maneuvers were unknown; target practice, something they read of. Their vessels deteriorated because the funds for repairs never got as far as the ships themselves. In fact, the *Alfonso XII*, the flagship, had not been able to move

under her own steam for one year before the *Maine* came, because almost every boiler-tube had gone—rusted and useless.

Then the troops, a miserable lot of recruits they were, landed from a transport one day, sent to the front the next, marching back and forth, through swamps and morasses, living in filth, one meal a day out of a common trough, fallen upon suddenly by insurgent bands, finally brought back, burning up with fever, to hospitals, which the majority of them never left again. And yet few deserted to the enemy. Unquestionably, the Spanish soldier who fought the insurgents in Cuba deserves this much credit, that he remained loyal, despite unceasing cruelty and suffering which few would have endured.

There were several thousand volunteer troops in the city consisting of the shop-keepers, clerks, waiters, and loyal Cubans. Certain battalions were inspected each morning on the Prado. They carried their rifles as farmers would hay-rakes. An imposing spectacle they presented at dress-parade. The authorities had tried repeatedly to send them to the front. But they declared emphatically, one and all, that, primarily, they were the home guard. I noticed that their posts were principally in charge of the soup-houses for the *reconcentrados;* so, no doubt, they had a strong political pull.

The military police in the city were picked troops, and, as a rule, were very fair specimens of the soldier. There were also the civil police, with whom every cabman and street vender had the privilege of discussing any orders given them.

In all, then, Havana was in a state of unquiet when the *Maine* arrived on the scene. The government was doing all it could to draw the minds of the people from the war. Mazzantini—the greatest living matador—was engaged for seven *corridas* at the Plaza de Toro, across the harbor in Regla. He was paid $30,000 for his endeavors to divert the distracted thoughts of the Havanese. Anonymous posters and incendiary circulars were scattered broadcast throughout the city. Some said the Autonomists were responsible for them. Several reached the *Maine*. One of them denounced the Yankee pigs in strongest terms; another upbraided the loyal citizens for tolerating the presence of an American warship in their beloved waters—could this be called Spain with honor?

The crowds returning on the ferry-boats from the bull fights would shout "Viva España," as they passed the *Maine*. In fact,

one brave boat load went so far as to cry out "Down with the Americans!"

The days went by rapidly. General Blanco returned to the city and Captain Sigsbee called—the call was not returned. We made excursions in and about the city, saw the troops coming and going, took bicycle tours through the suburban towns, down to Mariano Beach, out to the ball games at Védado. Yet, we never felt exactly at home. At the hotels, the Spanish and French officers were always shown preference. Often the cabmen would refuse to accept an American "fare." The French officers were tendered a large reception and ball; we were not invited. The greatest attention we received was shown us by the professional beggars and the *reconcentrados*—the latter fast developing into the former. In January, 29 of these unfortunates, driven into the city by both Spaniard and insurgent, died of starvation in the streets. That was the smallest number recorded in any one month. Since the outbreak of the war, the population of Cuba had been reduced 400,000—killed, died, or disappeared.

During the first week of February, Aranguren, a dashing insurgent leader, was betrayed, and a hundred Spanish troops were sent to take him. So they did—dead. From the consequent celebration and general jollification one would think that the insurrection had been quelled.

A few days later, a rumor was rife aboard ship that the *Maine* was to attend the carnival at New Orleans. The next day, we found that there were no orders to that effect. On the 12th, the *Dubordieu* left for the carnival, the Germans having sailed some time before. On the 13th, Sunday, a report was made of the rough drawing which had been discovered on the wall of a house in the city depicting the destruction of a battleship.

It has been mentioned above that the *Maine* was constantly prepared. The ordinary anchor-watch at night was supplemented by a regular quarter-watch, ready to jump to the guns at a moment's notice. Additional sentries were posted forward and aft, and, no boat, whether passing or coming alongside, escaped the challenge from our decks.

Tuesday, February 15, the last day of our good ship's life, arrived. It was a beautiful day, with a gentle northeast breeze blowing and the harbor full of craft. The coasting steamers at the docks, I remember, were getting cavalry troops on board, and as they were loaded, hauled out in the stream. I had the watch

from four to eight in the evening. Nothing of event occurred. I noticed that the wind had shifted to the northward, and the ship swung to that point; for we always rode head to wind there. Only once during our three weeks' stay had we headed in that direction.

At eight Lieutenant Blandin relieved me, as midshipmen stood the day watches only. The customary eight o'clock reports were made as usual; the night watch was mustered, ready to go on at nine o'clock. The men were dancing in the starboard gangway to an accordion's music. One of the gunners' mates was playing a mandolin in the after turret. We were accustomed to turning in early, and by nine o'clock when "pipe-down" went, several of the officers were already asleep. Many of us in the junior officers' quarters were getting letters ready for the morrow's mail. At three bells I was still writing, with but little clothing on—for it was very warm between decks.

The letter finished I was sealing it, when suddenly a report—the firing of a gun it seemed—startled me, followed at once as it was, by an indescribable roar, a terrific crash, intense darkness, and the deck giving away beneath. Out in the mess room, I groped my way, and found Bronson, a class-mate. "Come on," said he, "we'll make it," and in the passageway where the water was now ankle deep, we felt a draft of air from the forward end where once ship had been was now open to the sea. We made for the junior officers' hatch. We found it blocked by wreckage. One exit closed, though several near us were attempting to get up that way. Around the engine-room hatch, down which the water poured, we two picked our way aft, up what had been the ladder of the ward-room hatch, out through the cabin passageway and climbing the outside of the after superstructure found ourselves on the poop, safe. All the officers (save two) and a few of the men on watch, fortunately aft, had reached this, the only place of safety. The poor wretches, pinned down and drowning, mangled and torn, screamed in agony. A crew of officers and men jumped into the only boat left—the captain's gig—and pulled forward. The *Alfonso's* boats arrived, then came those from the Ward liner *City of Washington,* which had just come in from New York. The fire in the upheaved mass began to burn fiercely. Officers climbed forward on the debris, over the quarter-deck to lend assistance; they could do nothing there, everything had gone. The work of rescuing was progressing rapidly. One Spanish boat alone saved two-score men.

"Captain, we had better leave her," said Lieutenant Commander Wainwright, the executive officer, as the water washed the poop and the wreck sank deeper in the harbor ooze.

"Get into the boats, gentlemen," Captain Sigsbee said to us, quietly and sadly.

A muster of the survivors was made about a quarter after ten. Lieutenant Jenkins and Ensign Merritt were missing and more than 200 of the crew. Subsequent musters from the hospitals, from the vessels in the harbor, and from private houses throughout the city, up to the last recovery of a body, the latter part of March, showed that 260 lives had been sacrificed in a crew of 328 all told. Our wounded were given the best wards in the hospitals. Everything possible was done for them. Some lingered a few days in great suffering, many died the next morning.

The Spanish authorities took charge of the wreck at once, allowing no one near it. In the morning the *Mangrove* came in, followed by the *Fern*, two fleet tenders. That afternoon, the steamer *Olivette*, of the Plant line, took the survivors to Key West, with the exception of a few of the officers, detailed for duty with the wreck, who were to remain with Captain Sigsbee. We had contrived to get some clothing, for many of us had none. We then went to the Hotel Inglaterra, in which we made our quarters.

On Thursday, there was the public funeral of the bodies recovered at that time—only seventeen. It was a beautiful spectacle. First the marines, then the seaman battalion from the *Alfonso*. Behind them came the military, naval, and civil authorities; then, the long line of richly draped hearses. Following these, rode the officers of the *Maine* in carriages. Behind us marched the fire department in full force; then the civilians on foot; while hundreds of carriages brought up the rear. A sorrowful band we were, following our dead shipmates to their graves in foreign soil. For the Spaniards, however, it seemed, somehow, more of a gala-day festival. The streets were lined with spectators, and the police attended to duty so poorly, that the thoroughfares were often blocked.

The cemetery of Cristobal Colon is a beautiful spot outside the city, and there more than a hundred of the crew lie peaceful and undisturbed.

Our thoughts turned again to the wreck and next morning, Friday, Captain Sigsbee in one of the *Fern's* boats attempted to approach it; but the patrol boats would not allow this, as they

had other orders. This caused the delay of a day until we could be furnished with passes—the seal of the *Alfonso XII.* Permission was granted to hoist the American colors on the wreck; but as the order was not sent from headquarters, this also was not allowed by the officer in charge. Several hours were consumed in obtaining the order. The authorities would do anything for us—*mañana.*

The navy divers arrived from Key West and were idle at first. They must be accompanied in their work by Spanish divers, so said the authorities. Captain Sigsbee would not accede to this and an appeal to Washington changed the Spanish mind.

The next order that came from the palace stated that at least one Spanish diver must be present on the wreck when operations were going on, and that in no case was an American diver to go *outside* the ship. The claim of its being American territory was made at once. "*Inside,* yes, but not *outside,*" replied the Spaniards. It took some time to have this changed from Washington and, finally, our divers went where they pleased.

Meanwhile, the wrecking outfit arrived. First came the *Right Arm,* then the *Merritt* with the big barge *Sharp,* and, finally, the derrick *Chief.* The work of rescuing bodies was the first consideration, and, as they were recovered, our devoted Chaplain Chidwick took charge of them. The court of inquiry arrived on the *Mangrove* and began its first session. The *Montgomery* came in and Captain Sigsbee took up his quarters on board. The *Bache* made frequent trips with the convalescent and took several bodies home for burial.

One morning when we reached the water-front, we found every craft in sight covered with flags and banners, and later, amid deafening noises of bands and bombs and the cheers from the thousands, the Spanish cruiser *Vizcaya* entered the harbor from New York. She was followed, the next day, by her sister ship, the *Almirante Oquendo.* Rumors of war began to come in, yet the wrecking operations still went on. The court of inquiry left for Key West for a session and once more returned. After a time, Spanish authorities bethought them of a similar court, and very politely asked if their divers could go down. This was allowed them by the consul-general with the stipulation that they remain *outside* the wreck; for *inside,* they were informed, was *American* territory. There it stood. Nor did they ever go down within the wreck, and very little Spanish diving went on when the officer in

charge of it was not about. A large number of unexploded shell were recovered, several six pounders, and four of the 6-inch guns. There was not much else. The forward turret was never located; the after turret was on the bottom, still intact. The wrecking master and the dynamite expert showed that dynamite was absolutely necessary to recover the after 10-inch guns. The authorities were consulted. They were asked to allow the importation of 200 pounds of the explosive to be stored in their own keeping. This was not granted, the Spaniards claiming that their court of inquiry was not nearly through its work; and it was intimated that Captain Sigsbee wished to change the face of the wreck, and so destroy the evidences of an internal explosion. All knew what the conclusion of the Spanish court would be.

Internal explosion, indeed, when every sign, from the external pressure on exploded powder tanks to the double-bottom framing thrown up to the surface of the water, plainly indicated, that, whatever the cause had been, it was certainly foreign to the ship. Finally, our court completed its work and went home, while we awaited results.

The *Vizcaya* and the *Oquendo* sailed with secret orders. The Austrian cruiser *Donau* came in from New Orleans, and the Italian *Amerigo Vespucci* soon followed.

The newspaper men were getting nervous, rumor was rife, the Spaniards were uneasy. So were we. When would war be declared? was the question now.

"Of course we want war," said a Spanish army officer. "We know the result, still how can we lose Cuba more honorably?"

Americans were going home. Every outbound steamer was crowded. Cubans as well were leaving. Finally, a despatch ordered every officer home except Lieutenant Commander Wainwright. This was the 25th of March. Happy were we indeed—and I know Captain Sigsbee was glad to go, too, when the *Olivette* steamed out from the Morro and turned her nose northward across the Straits. How delicious was our first breath of fresh sea air after having been pent up so long in those filthy waters.

On April 6, the wrecking operations ceased and all concerned went home. The sequel is a well-known story, and as one contemplates the glorious victories of the American arms, ashore and afloat, one must surely feel that the lives of those seamen lost in Havana Harbor were not lost in vain.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

CAPTAIN WEIR'S AZIMUTH DIAGRAM

By LIEUTENANT E. R. MCCLUNG, U. S. Navy

Captain Weir's azimuth diagram as furnished to ships bears an explanation of only one of the several solutions of the astronomical triangle which can be performed with more facility by using this diagram than by any other method. Directions for solving problems in addition to the usual one of simply finding the azimuth where latitude, declination and hour angle are known are here printed in condensed form, with a view to removing the page, and, after cutting it in two pieces, pasting these pieces on the blank margin of the diagram. Any doubt as to the theory and method involved in these solutions will be removed by consulting the references to Muir and U. S. NAVAL INSTITUTE PROCEEDINGS.

No explanation of the proper sign to choose is here attempted as this will be made clear only by practice. Therefore, it is well to solve a sample problem under each case, assuming the same values for all, so that the results will, themselves, be a check on the work.

The cases are numbered with reference to the case already explained on the diagram as Case I. The following small table offers a ready means of selecting the known and unknown quantities and should also be cut out and pasted on a blank space of the diagram. Subscripts a and t indicate arc and time respectively, and the quantity in parentheses is the one to be found by the solution.

Use as	Case I	Case II	Case IIIa	Case IIIb	Case IVa	Case IVb
Hour Angle...	t	ta	(ta)	t	$\lambda 2 - \lambda 1 t$	Ct
Latitude.....	L	L	L	L	$L1$	L'
Declination....	d	(h)	h	(d)	$L2$	(D)
Azimuth.....	(Z)	Zt	Zt	Z	(C)	$\lambda 2 - \lambda 1$

DIRECTIONS FOR SOLVING ADDITIONAL PROBLEMS BY WEIR'S DIAGRAM

(See Muir, 1911, Appendix C, page 756, and U. S. NAVAL INSTITUTE PROCEEDINGS, December, 1908, page 1253.)

In all solutions reckon azimuth from elevated pole.

Case II.—Given L, d and t to find h and Z (to predict position of body, particularly a star). Find Z in usual manner by Case I, then convert Z into time and consider as an hour angle. Convert t into arc and consider as an azimuth. Use given latitude as latitude, and on declination scale read off true altitude, h.

Case III.—Given L, Z and h to find t and d (for star identification).

(a) Convert azimuth into time and consider as an hour angle. Use given latitude as latitude. Consider altitude as declination. On horizon circle read off body's H. A., expressed in arc and converted into time.

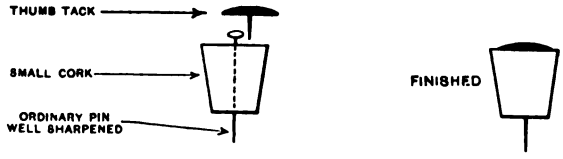
(b) Use known values of latitude, azimuth and hour angle as such and work backward to obtain declination.

Case IV.—(a) To find course to destination: Use latitude of place of departure as latitude. Consider difference of longitude converted into time as hour angle. Consider latitude of destination as declination, and on horizon circle read off Z—initial course required.

(b) To find distance to destination: Use latitude of place of departure as latitude. Consider difference of longitude as azimuth. Consider course converted into time as hour angle. Then on declination scale read off D, and distance to destination $= 90° = D$. Reduce this value to minutes of arc = nautical miles.

The following hints will make the use of the diagram very easy and convenient:

Make a number of pins after this fashion



Place new numerals along horizon circle as follows:

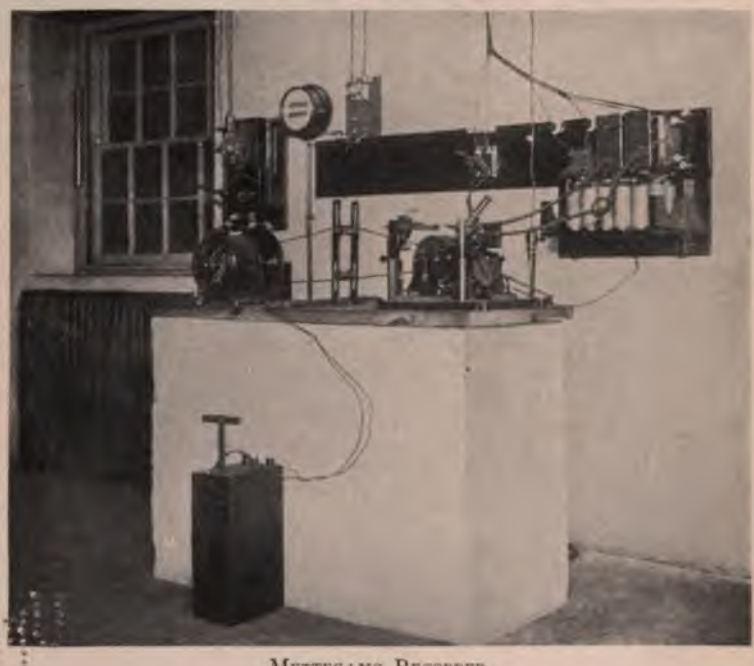
From equator (90°) to south pole, add, in red ink, numerals from 90 to 180, at every fifth graduation opposite to black numerals running from 90 down to 0, thus:

90°	....
85°	95°
80°	100°
75°	105°
etc.	etc.

From north pole to 105° and from south pole to 75°, place in black ink at each fifth division the value of hour angle equivalent to the degrees of arc, thus:

H. A.	Arc
0	0°
0:20	5°
0:40	10°
1:00	15°
1:20	20°
1:40	25°
2:00	30°
etc.	etc.

Each degree on the horizon scale being equal to four minutes of time, with these new numerals to aid the eye, time can be converted into arc, and the reverse operation performed, instantly.



METTEGANG RECORDER.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

A STUDY OF THE RATE OF DETONATION APPARATUS OF THE U. S. BUREAU OF MINES (METTEGANG'S RECORDER)

By RUSSELL B. MUNROE

WITH SUPPLEMENTARY REPORT

By A. J. STRANE[1]

At the Fifth International Congress of Applied Chemistry at Berlin, Dr. Mettegang described[2] a recording instrument of his invention for use in determining the rate of detonation in explosives. This instrument met with such approval that when, in 1908, the testing station of the Bureau of Mines at Pittsburgh was created, Dr. Holmes installed there one of Mettegang's recorders which has been in use ever since.

As the Mettegang recorder at Pittsburgh differs in details of construction from that described in the Reports of the Berlin Congress and in other publications, it may be well to preface this article with a description of the Pittsburgh instrument and its use, as given on pages 92 to 95 of Bulletin No. 15 of the Bureau of Mines.

Provided all other conditions remain the same, the shattering effect of an explosive varies with the velocity with which the explosion wave or explosive reaction travels through the charge of the explosive. In explosives fired by detonation this movement as measured in definite terms of time and length is styled the rate of detonation.

In every explosion, however initiated, the cross-sectional area that the exposed surface of the explosive immediately presents to the exciting cause or agent, is a most important factor in determining the final effect. In all of the tests of detonating explosives that have been made at the Pittsburgh testing station, mercuric fulminate, or a mixture of this substance with potassium chlorate alone or with other substances, has been

[1] Published by permission of the Director of the Bureau of Mines.

[2] Messung der Detonationsgeschwindigkeit von Sprengstoffen, Rept. of Berlin Congress, Vol. II, pp. 322-328, Berlin, 1904.

used in electric detonators as the exciting cause. To assure the exposure of a definite and uniform area of the explosive to the action of the electric detonator the explosive is placed in tubes of thin sheet iron, 42 inches (107 centimeters) in length and 1½ or 2 inches (3.8 or 5.1 centimeters) in diameter. The variations in the diameter of the iron tubes used are permitted in order to meet the requirements of the different explosives to be tested and to allow for the different diameter of the cartridges in which they are furnished for use in blasting.

When the tube has been charged with the desired amount of the explosive to be tested, two copper wires are inserted through perforations in the tube and cartridge file, at a distance of 1 meter apart, so that the column of explosive between these wires is 1 meter long. The copper wires are each led to a recording chronograph. A No. 7 electric detonator is inserted in the tube, in one end of the column of explosive. The tube with its contents is then suspended in the firing chamber, the copper wires are connected up to the recording chronograph, and the electric detonator, which has been connected to a dynamo electric machine, is fired. Of the two copper wires passed through the tube, the one that is nearest the electric detonator is ruptured first. As the explosion wave proceeds through the column of explosive the second wire is eventually reached and ruptured. The time which elapses between the rupturing of the first and second wire measures the rate at which the detonation proceeds through the column of explosive.

The time which intervenes between the rupturing of the first wire by the explosion of the electric detonator and the rupturing of the second wire by the detonation of the last layer of explosive at 1 meter's distance from the first wire is measured by means of the Mettegang recorder shown in the plate given herewith.

The primary components of the Mettegang recorder are a soot-covered bronze drum so connected to an electric motor that it may be caused to revolve at any desired speed up to 105 revolutions per second; a 220-volt direct-current motor provided with a rheostat for controlling its speed; a vibration tachometer so connected to the bronze drum that the number of revolutions of the latter in unit of time are accurately measured for any speed between 50 and 105 revolutions per second; induction coils, the primaries of which receive their current from an electric-lighting circuit having a terminal pressure of 220 volts, and platinum terminals placed about .25 millimeter (.01 inch) from the surface of the rotating drum and in circuit with the secondaries of the induction coils, by means of which electric sparks are so projected against the surface of the drum as to disturb its sooty covering and produce tiny bright spots at the point of impact. These spots may be easily perceived by the aid of a microscope attached to the recorder.

The drum is 500 millimeter (19.69 inches) in circumference. The edge of this drum is provided with 500 teeth which may be made to engage an endless screw. A pointer attached to this screw passes over a dial reading to hundredths, thus indicating with great precision the distance intervening between the spots produced on the soot-covered surface of the drum. The

drum is provided with six platinum terminals held by an insulated arm that may be so moved as to bring the points within any desired distance from the drum. Each one of these points may be put in series with one of the secondaries of the induction coils, while the other end of the electric lead is grounded to the drum through the base which supports it. Only two of the platinum terminals are used in any single firing trial for the determination of the rate of detonation in a given explosive; the other four are held in reserve for future use.

In ascertaining by this method the rate at which detonation once initiated is transmitted through a column or file of an explosive, the electric current used as the medium for transmitting the record is divided into two parts by passing it through two equal lamp resistances each of which, at the Pittsburgh testing station, consists of a series of from 5 to 20 16-candle-power lamps. After independently traversing the cartridge file at the initial and final points, the two leads are jointly connected to one of the poles of the primary of the induction coil through which the current passes to the return conductor. The secondary of the induction coil is then connected by one pole to the two platinum terminals and by the other pole to the base supporting the drum as described. In the induction coil, as is well known, any change of tension in the primary coil sets up an induced current in the secondary coil, and this mutual induction between the coils results in the production of a higher potential difference at the terminals of the secondary coil, so that sparks of considerable length and intensity may be obtained. In the earlier part of the work at the Pittsburgh testing station circumstances were such that coils provided with iron cores were used, and all the data for rate of detonation test recorded in this bulletin were obtained with iron-cored coils. By a readjustment of the apparatus, induction coils without iron cores were made to give the desired kind of sparks, and such coils have been used in all subsequent tests made at the station.

The vibration tachometer, by which the speed of rotation of the drum is measured, is connected to an auxiliary shaft that engages the main shaft of the drum by gears, thus preventing any irregularity in recording the speed due to slipping. This tachometer measures the number of rotations of the drum, but, as the circumference of the drum is accurately known, the distance per second which any point on the periphery travels may easily be calculated. Hence, at the highest speed of 105 revolutions per second, the distance of travel is 52.5 meters (172.2 feet) per second. At 50 revolutions it is 25 meters (82 feet) per second. At 86 revolutions, the number commonly used in the tests at the station, it is 43 meters (141 feet) per second.

The distance between the spots impressed on the surface of the drum are, as has been previously intimated, accurately measured by means of the filar eyepiece and the endless screw, the spots being focused on the cross hairs of the eyepiece.

The iron tube containing the cartridge file is suspended in the chamber and the explosive is fired. This chamber is a circular pit that was formerly used as the well of a gasometer. In adapting the pit to its new use the top of the gasometer was cut off and placed at the bottom of the pit on a bed

of sawdust, and the space between the gasometer and masonry walls of the pit was filled with sawdust. The cover of the pit consists of heavy timbers framed together and overlain with 12 inches (30.5 centimeters) of concrete reinforced by six I-beams. Four straps extend over the top and down to eight "dead men" planted about 8 feet (2.44 meters) below the surface of the ground. The pit is 16 feet (4.88 meters) in diameter and 11 feet (3.35 meters) deep. A manhole in its cover provided an entrance to the interior.

METHOD OF CONDUCTING TEST

The rate of detonation is measured through a cartridge file 42 inches (107 centimeters) in length. In making a test the separate cartridges, having the paper cut from their ends to avoid the damping effect to its folds, are placed end to end in a sheet-iron tube 42 inches (107 centimeters) long and either 1½ or 2 inches (3.8 or 5.1 centimeters) in diameter, depending upon the diameter of the cartridges used. Two copper wires leading from the Mettegang recorder are passed 1 meter (3.28 feet) apart through the cartridge file and firmly secured. The charge thus arranged is suspended horizontally in the pit and exploded by an electric detonator placed in one end of the cartridge file. The drum of the Mettegang recorder is rotated at the desired speed, and the electric detonator is fired by an electric firing device placed near the recorder. As the wires that pass through the cartridge files are broken, spots are formed on the drum, the distance between the spots at a constant speed of the drum being proportional to the time elapsing between the breaking of the wires. When the peripheral speed of the drum is 43 meters (141 feet) per second, the smallest time interval which it is possible to measure is $\frac{1}{4,300,000}$ part of a second, although with the distance between wires equal to 1 meter (3.28 feet) such refinement is not necessary.

All high explosives are tested in cartridges having a diameter of 1¼ inches (3.2 centimeters). If an explosive with this diameter fails to detonate completely, cartridges having a diameter of 1¾ inches (4.4 centimeters) are used. If an explosive should fail to detonate completely with 1¾ inch (4.4 centimeter) cartridges it is considered unsatisfactory and is not eligible for the permissible list.

If the explosive submitted for tests is not in cartridges of 1¼ inch (3.2 centimeter) diameter, it is repacked, care being taken that the specific gravity as determined in the physical examination has not been altered.

The rate of detonation, which is expressed in meters per second, is computed from the speed of the drum and the distance between the spark points, as illustrated in the following example:

In the test of Carbonite No. 1 on March 20, 1909, the speed of the drum was 43,000 millimeters per second and the distance between spark spots 12.63 millimeters. Therefore, 43,000 millimeters were traversed in one second, 1 millimeter in $\frac{1}{43,000}$ seconds, and 12.63 millimeters in $\frac{12.63}{43,000}$ seconds. Hence, $\frac{12.63}{43,000}$ seconds is the detonation time for a 1-meter length of the

explosive, and one second is the detonation time for $\frac{43,000}{12.63}$ meters, or a 3405-meter length of the explosive.

THE TESTS

This study was undertaken to determine the maximum variation in the calibration of the Mettegang recorder and how best to reduce this variation to a minimum.

The machine was first put in adjustment. That is, all of the spark points were brought into line with regard to their distances from the drum, and the arm carrying them was adjusted so that their travel across the drum was parallel with its surface. To adjust the points, the drum was first coated with soot and one needle adjusted to just touch the drum, as indicated by a scratch produced in but not through the soot on the rotating drum. The arm carrying the points was then adjusted so that the point would just scratch the drum completely across its face when the arm was run back and forth. The other points were then screwed down until they just marked the drum when it was rotated. The graduation on the graduated screw controlling the vertical movement of the arm was noted and called the zero point. The points were then raised .22 millimeters and ten shots fired with the drum standing still (Table I).

TABLE I

Electric Detonator M. 1806 A. Spark Gap, .22 mm. R. P. S., 0

Trial	1	2	3	4	5	6	7	8	9	10	Aver.	Max. Var.
1–2...	3.92	3.64	3.90	4.31	4.12	3.84	3.70	3.78	3.83	3.55	3.86	.67
1–3...	4.06	3.84	4.04	3.97	4.12	4.00	3.83	4.14	4.03	3.87	3.99	.21
1–4...	4.15	3.77	4.04	4.15	4.19	4.14	3.98	4.05	4.03	3.71	4.02	.41
2–3...	.14	.20	.14	—.34	.00	.16	.13	.36	.20	.32	.13	.70
2–4...	.23	.13	.14	—.16	.07	.30	.28	.27	.19	.16	.16	.46
3–4...	.09	—.07	.00	.18	.07	.14	.15	—.09	—.01	—.16	.03	.34

After these 10 shots had been fired, two shots each were fired with the points .44, .66 and .88 millimeters from the drum. The variation in distance between the craters was not noted, but the effect of sparking distance upon the shape of the spark crater was observed.

A set of three readings was then made with the drum running 90 revolutions per second and a spark gap of .22 millimeters (Table II).

TABLE II

E. D. M. 1806 A. Spark Gap, .22 mm. 90 R. P. S.

Trial	1	2	3	Aver.	Max. Var.
1-2..	4.11	3.98	3.92	4.00	.19
1-3..	4.25	4.09	4.06	4.13	.19
1-4..	4.45	4.22	4.16	4.28	.29
2-3..	.14	.11	.14	.13	.04
2-4..	.34	.24	.24	.27	.10
3-4..	.20	.13	.10	.14	.10

TABLE III

E. D. M. 1806 A. Gap No. 1, .44 mm.; No. 2, .22; No. 3, .22; No. 4, .44. 90 R.P.S.

Trial	1	2	3	Aver.	Max. Var.
1-2..	4.14	4.68	4.80	4.54	.66
1-3..	4.40	3.99	4.64	4.34	.65
1-4..	4.26	4.55	4.84	4.55	.58
2-3..	.26	—.69	—.16	—.20	.95
2-4..	.12	—.13	.20	.03	.33
3-4..	—.14	—.56	.36	—.11	.92

Points numbers two and three were then screwed down until they just touched the drum and the whole arm then raised .22 millimeters. This made points one and four .44 millimeters from the drum, and points two and three .22 millimeters from the drum. As it happened, points two and three required just half a turn to bring them down .22 millimeters. Hence, not only the effect of sparking distance was observed but also whether the rotation affected the results.

One set of three readings was taken with the drum standing still and one set was taken with the drum running at 90 revolutions per second, with this spark setting (Tables III and IV).

TABLE IV

E. D. M. 1806 A. Gap No. 1, .44 mm.; No. 2, .22; No. 3, .22; No. 4, .44. R.P.S., 0.

Trial	1	2	3	Aver.	Max. Var.
1-2..	3.79	4.07	3.97	3.94	.28
1-3..	3.95	4.07	4.25	4.09	.30
1-4..	3.95	4.25	4.25	4.15	.30
2-3..	.16	.00	.28	.15	.12
2-4..	.16	.18	.28	.21	.12
3-4..	.00	.18	.00	.06	.18

TABLE V

E. D. M. 1806 A. Gap No. 1, 1.10 mm.; No. 2, .22; No. 3, .22; No. 4, 1.10. R.P.S., 0.

Trial	1	2	3	Aver.	Max. Var.
1-2..	3.94	3.91	3.80	3.88	.14
1-3..	3.98	4.15	3.83	3.99	.32
1-4..	4.18	4.15	4.03	4.12	.15
2-3..	.04	.24	.03	.10	.21
2-4..	.24	.24	.23	.24	.01
3-4..	.20	.00	.20	.13	.20

The arm was then raised .66 millimeters and points two and three screwed down one turn or .44 millimeters. This made points one and four 1.1 millimeters from the drum, and points two and three, .22. Two sets of readings were made as before (Tables V and VI).

TABLE VI

E. D. M. 1806 A. Gap No. 1, 1.10 mm.; No. 2, .22; No. 3, .22; No. 4, 1.10. 90 R.P.S.

Trial	1	2	3	Aver.	Max. Var.
1–2..	3.84	3.75	3.93	3.84	.18
1–3..	4.02	3.96	4.18	4.05	.22
1–4..	4.03	3.80	4.32	4.05	.52
2–3..	.18	.21	.25	.21	.07
2–4..	.19	.05	.39	.21	.34
3–4..	.01	—.16	.14	.00	.30

TABLE VII

(Four misses in 6 shots.) E. D. M. 1806 A. Gap, .30 mm. 90 R.P.S. Magnetic cores.

Trial	1	2	3	Aver.	Max. Var.
1–2..	3.41	3.64	3.50	3.52	.23
1–3..	3.46	3.49	miss	3.48	.03
1–4..	3.41	3.75	3.84	3.67	.43
2–3..	.05	—.15	—	—.05	.20
2–4..	.00	.11	.34	.15	.34
3–4..	.05	.26	—	.15	.21

The points were then all adjusted to .22 millimeters from the drum, and $\frac{3}{8}$-inch iron rods placed through the center of the induction coils as magnetic cores. The rod passing through coil number 3 was provided on each end with a thread and two nuts, between which a piece of $\frac{1}{8} \times \frac{3}{4}$-inch strap iron, in the form of a U, 21 inches between the legs and 5 inches deep, was clamped to form a complete magnetic circuit.

A set of three readings was then taken with a .30-millimeter spark gap and the drum running 90 revolutions per second (Table VII). The cores were then removed and a set of 10 readings taken with a .30-millimeter spark gap and the drum running 90 revolutions per second (Table VIII).

TABLE VIII

E. D. 1806 A. Gap, .30 mm. 90 R. P. S.

Trial	1	2	3	4	5	6	7	8	9	10	Aver.	Max. Var.
1–2..	4.20	4.17	4.16	4.28	4.45	4.25	4.29	4.32	4.17	4.12	4.24	.33
1–3..	4.33	4.30	4.34	4.37	4.45	4.87	4.44	4.45	4.20	4.20	4.38	.67
1–4..	4.20	4.34	4.24	4.40	4.40	4.60	4.14	4.27	4.00	4.03	4.26	.60
2–3..	.13	.13	.18	.09	.00	.62	.15	.13	.03	.08	.14	.62
2–4..	.00	.17	.08	.12	—.05	.35	—.15	.05	—.17	—.09	.02	.34
3–4..	—.13	.04	—.10	.03	—.05	—.27	—.30	.18	—.20	—.17	—.12	.34

In all the preceding tests use was made of a number 7 electric detonator to break the circuit. To do this four pieces of number 26 B. & S. double cotton-covered copper wire were half hitched about the portion of the detonator containing the charge. Use was made of a running half hitch (or clove hitch), so as not to kink the wire. One of the wires was placed in each of the induction coil circuits.

Another set of these readings was made with the .30-millimeter spark gap and the drum running 90 revolutions per second, but dynamite was used in the standard way to break the circuits (Table IX).

TABLE IX

E. D. 1806 A. Explosive D 1906 A. Gap, .30 mm. 90 R. P. S. Standard Method (Circuit broken with dynamite)

Trial	1	2	3	4	5	6	7	8	9	10	Aver.	Max. Var.
1–2..	4.22	4.28	4.08	4.12	5.20	4.24	4.44	4.51	5.35	4.90	4.53	1.27
1–3..	4.34	4.31	4.15	4.26	5.02	4.78	4.64	4.26	4.99	4.69	4.54	.87
1–4..	4.16	4.20	4.10	4.14	4.80	4.40	4.25	4.70	4.45	3.91	4.31	.89
2–3..	.12	.03	.07	.14	—.18	.54	.20	—.25	—.36	—.21	—.01	.56
2–4..	—.04	—.08	.02	.02	—.40	.16	—.19	.19	—.99	—.99	—.23	1.15
3–4..	—.18	—.11	—.05	—.12	—.22	—.38	—.39	.44	—.54	—.22	—.19	.98

CONCLUSIONS

As will be seen from the preceding tables, the distance of the spark point from the drum did not materially affect the readings. The only noticeable effect was that the percentage of misses increased as the spark gap increased.

The spark crater was not measurably affected in size or shape by the sparking distance. In the case of points one and three, it consisted of a group of spots in the form of a circular cluster approximately $\frac{3}{4}$ millimeter in diameter, while two and four were merely smudges with occasionally a bright spot in the center. This was so in all cases save where the iron core was used, when points one and three appeared as a line of spots.

In all cases when the drum was rotating the head spot was taken as the point to measure to, and when the drum was at rest the center of the cluster was used.

The iron cores did not seem to appreciably decrease the maximum variation, but did increase the percentage of misses. The sparks in this case are much more easily read.

The deficiency in the instrument seems to arise from two sources, the character of the spark crater and the method of breaking the circuit.

The first cannot well be remedied without impairing the accuracy or the simplicity of the instrument.

The coils could be so designed as to produce a single intense spark, but then this would be only produced at a critical sparking

distance. At greater distances no spark would mark the drum, and at best there would be a number of sparks as at present.

Should coils having a magnetic core be used, the period of sparking would be decreased so as to produce a line of sparks, the head of one of which could easily be read, but then the time lag of the coils would become an appreciable factor. All of the coils would have to be very accurately built, installed and calibrated, and even then would not be correct, as there is a slip connection in the sparking circuit between the coils and the drum, and this would have a varying resistance which would materially affect the accuracy, as the period, and hence the lag, is dependent to a considerable extent upon the resistance of the circuit.

The only other general type of coil is that producing an undamped spark such as is in use at present.

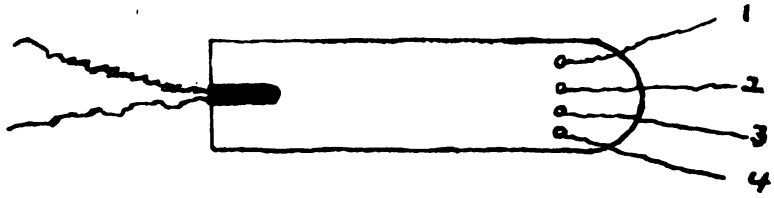
The question of spark coils does not appear to be as important as the method to be used in determining the zero of the instrument, or, more specifically, the method of breaking the wires. If the readings obtained by using a detonator are compared with those obtained using dynamite in the standard way, it will be seen that the maximum variation obtained using dynamite in the standard way is very large. I question whether using dynamite in the standard way is a fair one. It does not simulate the conditions obtained in a standard file in any way save that the wires pass through the explosive.

I cannot see why wires passed through the explosive should be broken with any uniformity. In the case of the file, the metal case tears the wires apart, and when they are properly kinked over the case uniform breaking may be expected. This is not the case with the single cartridge. In some cases the wires were found with the insulation stripped back for a considerable distance and the wires badly elongated, showing that an appreciable period had elapsed before the wires broke. Hence if the wires are of material having exactly the same physical constants, a variable enters.

It would seem that the detonator method is the fairest method, as here the wires are so arranged as to insure a fair degree of uniformity in breaking, and the rate of breaking is so high as to reduce its effect to a minimum. It would seem that this variation cannot be much reduced below .50 millimeter, under the present conditions, but the instrument should be read as close as possible so as not to increase this variation.

SUPPLEMENTARY REPORT

Previous to the tests by Russell B. Munroe, it was customary to calibrate the Mettegang recorder before each series of tests by breaking the wires when arranged thus:



¼ x 8-INCH CARTRIDGE WITH DETONATOR.

and with the drum running and points .22 millimeter from it.

Since Munroe raised the question of the accuracy of this method of breaking, the wire tests have been conducted by placing the 8-inch × 1¼-inch cartridge in a 1⅜-inch galvanized-iron tube and proceeding as before, but with the copper wires kinked on each side of the tube at the position where they passed through small holes in it.

Ten shots were fired in this manner with the spark points .22 millimeter from the rotating drum (Table X).

TABLE X

E. D. M. 1806 A. Explosive D., 2014 C. Gap, .22 mm. 90 R. P. S.

Trial	Distances Read Between Spark Points (millimeters)					
	No. 1-2	No. 1-3	No. 1-4	No. 2-3	No. 2-4	No. 3-4
1st	+4.22	+4.43	+4.43	+.21	+.21	.00
2d	+3.57	+3.70	+3.91	+.13	+.34	+.21
3d	+4.31	+3.95	+4.00	—.64	—.31	+.05
4th	+4.05	+4.16	+4.30	+.11	+.25	+.14
5th	+4.14	+3.88	+3.74	—.26	—.40	—.14
6th	+3.72	+4.14	+4.30	+.42	+.58	+.16
7th	+4.48	+5.40	+4.25	+.92	—.23	—1.15
8th	+3.97	+3.95	+4.75	—.02	+.78	+.80
9th	+3.95	+4.25	+4.18	+.30	+.23	—.07
10th	+4.74	+5.88	+5.11	+1.14	+.37	—.77
Average	+4.12	+4.37	+4.30	+.23	+.16	+.01
Max. Var.	1.17	2.10	1.37	1.78	1.18	1.95

TABLE XI

Actual Corrections for Spark Points. Obtained by Lowering Arm so that Points Marked on the Soot

No. 1-2	No. 1-3	No. 1-4	No. 2-3	No. 2-4	No. 3-4
+4.16	+4.30	+4.35	+.14	+.19	+.05

TABLE XII

Variation of Average Recorded Distances from Actual Correction

No. 1-2	No. 1-3	No. 1-4	No. 2-3	No. 2-4	No. 3-4
—.04	+.07	—.05	+.09	—.03	—.04

TABLE XIII

Maximum Variation of Recorded Distances from the Actual Distances

No. 1-2	No. 1-3	No. 1-4	No. 2-3	No. 2-4	No. 3-4
—.59	+1.58	+.76	+1.00	±.59	—1.20

The actual distances between the platinum spark points in the direction of the rotation of the drum were laid off on the soot-covered drum by lowering the arm supporting the screws until the points scratched the soot as the arm was moved in a horizontal line (Table XI).

The following figures were calculated to show the variation between the actual correction for spark points (Table XI), and the recorded distances (Table X).

1	was	more	than	1.50	mm.	in error.
4	were	"	"	1.00	"	" "
9	"	"	"	.75	"	" "
15	"	"	"	.50	"	" "
28	"	"	"	.25	"	" "
44	"	"	"	.10	"	" "
50	"	"	"	.05	"	" "
56	"	"	"	.02	"	" "
4	"	less	"	.03	"	" "

In no case was the average of the six corresponding distances more than .09 millimeter in error (Table XI).

CONCLUSIONS

From the results of these tests, as well as from those conducted by Munroe and from previous experience with the Mettegang recorder, the following conclusions are evident:

1. The recorded distance between any two spark points may be more than 1.50 millimeters in error in either direction (Table XIII).

2. The same result, with narrow limits of error (Table XII), may be obtained by lowering the spark points to mark the soot coat, as can be obtained by running a series of 10 shots with the drum rotating and breaking the wires with high explosive.

3. The degree of accuracy of reading the distances between the spark points is out of all proportion to the accuracy with which they are established (Table XIII).

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE WAR CRUISES OF H. M. S. *KARLSRUHE*

EXTRACTS FROM MY WAR-DIARY

(CONCLUDED)

By LIEUTENANT AUST

Free translation by LIEUTENANT J. H. KLEIN, JR., U. S. Navy

PROFITABLE WORK

4 September.—The following night was very light and clear. For the first time since our separation on 6 August we heard from the *Kronprinz Wilhelm*. We heard her radio without, however, endeavoring to communicate with her, as we did not wish to give away our position. As we well knew, there were 11 English warships all around us, among them some of our old acquaintances of the West Indies. We therefore decided to be as still as a mouse, even though we preferred to have an hour of gossip with Lieutenant Thierfelder.

5 September.—On the night following we again heard much radio work. Among the many secret code messages between the English cruisers we heard the report that the steamer *Kap Trafalgar* had been transformed into an auxiliary cruiser for work on the South American coast, and that our gunboat *Eber* had entered Bahia under the commercial flag. Then the land station, Olinda, at Pernambuco, reported in Italian to an Italian passenger steamer these short but comprehensive sentences: "Germans before Paris; Russians in Lemberg; Turkey has declared war on the Allies."

The Germans before Paris! Then next morning at reveille there was a big hullaballoo in the ship. Soon we had forgotten all fears that had sprung up at the beginning of the war when the declarations of war followed like one blow after another. The small grains of truth contained in these few words dispelled all the lies which had reached us heretofore.

When we met the *Asuncion* that afternoon she told us that the *Kronprinz Wilhelm* had spent the entire day of 3 September taking provisions from her. We must have passed each other at no great distance. Thierfelder had left a letter for the captain in which he reported his operations up to that time. Although we were very sorry not to have seen him, we were pleased to know that he was as well off as we were and that he lacked nothing.

6-8 September.—After the *Asuncion* had transferred the *Strathroy's* crew to the *Krefeld,* the *Karlsruhe* hurried to the calm place where the *Strathroy* waited for us with her cargo of coal. The coaling lasted until 8 September.

The glowing heat made the coaling a very hard task. The entire crew worked during daylight. During the night the crew was divided into two watches, which relieved each other every four hours.

These days were the most dangerous, perhaps the only dangerous, ones we had. In the open sea it was not so easy to surprise us. Steam was kept up to the highest pressure so that the engines were always ready for full power. Of course the guns and torpedo-tubes were always kept ready for action.

But all this changed as soon as we took the steamer alongside in order to get coal out of her. Readiness for action was seriously interfered with. Should an enemy appear the ships would first have to get clear of each other. Then we would have to get rid of the coal that was piled all over the deck and thus prevented the service at the guns. In any event much time would be lost before the ship could have been properly cleared for action.

This loss of time might be the deciding factor against us if an enemy ship should approach our coaling place by night or in inclement weather, such as we often suffered, especially in the early morning.

At night all unnecessary lights were doused. On the sea side the ships were entirely darkened. Low-powered lights burned only in the cargo holds of the steamer and at the most important places on the *Karlsruhe.* On such days the lookouts were doubled and only responsible men detailed for this duty.

9 September.—After filling up with coal we again set out to waylay ships. We took *Krefeld* and *Rio Negro* along; one formed our eastern scouting face, the other the western.

10-13 September.—In order to use as little coal as possible, that is, in order to reduce the dangerous coaling days to a minimum, the captain stopped the ship.

As long as no steamer appeared to give us work and diversion the time passed slowly and monotonously. Several hours were devoted daily to drills, usually "general quarters." In the leisure hours shark fishing was the best sport. The sharks on the high seas are smaller than the giant fishes that inhabit the waters along the Mexican gulf coast. They are hardly two meters long. It is surprising how quickly these beasts will appear if there is anything to be had. A short time after the ship stopped they swarmed around under our stern. As soon as they showed themselves the shark hooks were put over and some of them were soon caught.

The shark-shooters, however, had more success than the fishers. Several officers on the bridge or on the quarter deck shot the sharks whenever, in their eagerness, they showed their heads above water trying to grab the hunks of meat that were suspended close to the surface. Several of the robbers were sent back to the deep with battered heads or shattered spines.

Every time that the ship stopped for a time to transfer provisions, etc., from a captured steamer, a school of sharks soon gathered near our stern. Soon the rifles were busy cracking away at them.

14 September.—We were beginning to grow impatient because no smoke clouds came in sight. During the night of 14 September the engines suddenly went ahead from "Stop" to a high speed. We hurried to the bridge and saw the lights of a steamer ahead of us. The captain waited until the gray of morning and then set out for her. Her patriotic colors on her smoke-pipe were very pleasing to us: "Black, white, red"; much more pleasing than the English flag which she soon hoisted. As she paid no attention to our polite flag signal but kept going ahead undisturbed, we had to make our meaning plain by firing a blank shot. That worked at once.

The steamer was the *Highland Hope* of the Nelson Line. She was heading for Argentina to take a cargo of cold-storage meat to England. For this purpose she had been fitted out with a brand new cold-storage plant. In order not to delay her return to England she had been amply provisioned and coaled beforehand so that she would not have to stop to do this before starting back.

In addition to all these useful presents the Englishman brought us a complete file of English newspapers. These included even the illustrated papers. We saw, for the first time, pictures of the war. You can imagine how eagerly we all pounced on them as soon as the prize officer sent them aboard. In a very short time they disappeared in the mess rooms, officers' rooms and the men's quarters. As the newspapers contained some news items which would be of service in our operations (as, for instance, the steamer schedules, the arrival of strange warships in the various harbors, etc.), the captain ordered the prize officer to be sure that hereafter all the newspapers were sent to the bridge. It was very funny to see how one after another stole into the chart house to get a peep at the papers. The captain himself would get so interested in the news that it was hard to drag him away from them to dictate the answers that were to be signalled to the prize officer who sat over there impatiently swearing that he would not "find" any newspapers on the next steamer. But he did it just the same and the same proceeding would be repeated, everybody on the bridge quickly interesting himself in the newspapers.

The articles were neither easy nor good to read. Only after much labor could we wade through all the thick lies and finally reach a few words of truth and, in spite of all the twisted and hidden meanings, arrive at a picture of the approximate condition of affairs in Europe. We knew what value to place on the lies. After our experiences in San Juan and Wilemstad we did not expect much else. It was more difficult to understand the hate which was attached to everything German. Even the better papers, like the *Illustrated London News*, made no secret of this. None of us expected this attitude from a nation that prided itself throughout the world on its position and associations. In the middle of this slander were the Kaiser and the Crown Prince. Of the generals, General von Kluck seemed to have drawn most of the British hate. Hair-raising stories were told of him. From this we gathered that he had been the most successful general in the west, and, as we later discovered, we were correct. After Kluck came all the other generals, the other officers and then the entire army with their atrocities. And these papers were distributed throughout the world on thousands of steamers!

In our anger we cast the yellow sheets aside, only to get them back again shortly after, because they were the sources of our only reports.

The captain undertook to clip and paste the worst lies and slanders. In this way he gathered a thick folio. He called it "The Gathering of Lies."

Up to this time we had had the luck to meet nothing but English steamers, even though this main artery of commerce was used by many neutral steamers. While we were going through the regular work of transferring the crew to the *Krefeld*, taking over the radio apparatus, provisions, etc., a larger steamer was sighted which, from her radio conversation, we knew to be the Spanish steamer *Reina Victoria Elena* of the Compania Maritima of Barcelona. The reports from the radio rooms were substantiated by the outward appearance of the vessel and the Spanish mail flag which she flew, so that the captain decided not to search her. When she came in sight she asked, by radio, for our name and would not keep quiet. As her ceaseless questioning finally grew tiresome, the captain sent her the answer, "Convoying British ships." Even though we gave this answer as weakly as possible, an English ship, in our immediate neighborhood, could not help but pick it up. Of course, she immediately questioned the Spaniard concerning the remarkable "convoy" of which she knew nothing. But the Spaniard would not answer her. Instead the Spaniard asked her name, which she gave in such an indistinct manner that we could not make it out. The Spaniard then gave the Englishman her position.

This incident was rather unfortunate for us. Until that time we had been lucky enough to conceal the scene of our operations. And now, because of this accident, everything might be ruined.

The captain decided to leave the commercial route to Europe for a while and to go instead to the route to North America in order to try his luck. *Highland Hope* was blown up. Then the *Karlsruhe* with her two attendant steamers headed westward.

15 September.—We arrived in the track of the sailing ships. Since the beginning of the war we had not as yet run across a sailing vessel. On this day we met two. The first was a three-masted, full-rigged ship flying the Norwegian flag. A large sailing vessel under full sail is a beautiful sight, especially in the trade-wind region where the sun shines from a cloudless sky down on the azure blue ocean. The ship hove to at our order. She was the *Sorfareren* of Christiansand. She came from New Caledonia and was carrying a cargo of chromium for a Nurenberg firm to

Gothenburg. Therefore the captain was treated very politely. We were so fortunately situated that we could present him with half of a freshly slaughtered sheep and some new potatoes, which caused the captain no end of wonderment. He received this most gratefully and acknowledged our flag signal, "Pleasant voyage," with the same wish.

The second sail hove in sight that afternoon. She was a three-masted bark, apparently also a Norwegian. The captain decided not to stop her.

During the last eight days we had captured only one steamer. We now had to plan on filling up our bunkers. The coal supply was never permitted to fall below a certain amount, because we had to be ready for almost anything, such as meeting enemy war-ships and being pursued for a long time.

17 September.—We were rather downcast over our bad luck in having to leave the main commercial lane when our lookout reported: "Smoke, four points on port bow," and the ship immediately livened up. Eight bells had just been struck. The steamer—it was a steamer—fell, so as to speak, in the middle of our soup at dinner.

Of course the mastheads appeared over the horizon first. Very quickly thereafter came the smoke-pipe. And then, for a long time nothing more showed up, the smoke-pipe growing longer and longer. Mirages are rare in these waters. Therefore the steamer must have an especially long funnel. And this was the case as we soon discovered. Even when at a great distance away she hoisted the English flag.

Indrani was the name of our new acquaintance. Her home port was Liverpool. She seemed to be new and in excellent condition. The officers in their clean white tropical uniforms stood around on the bridge, where we also noted some especially fine and comfortable Madeira chairs. The Chinese crew were dressed in freshly washed, light-blue garments. We hoped that this ship would be laden with general merchandise. All eyes were glued on the signal flags of the prize-quartermaster. Then he signalled: "6700 tons Pocahontas coal from Norfolk to Rio de Janeiro." It seemed as if the English actually knew that we were on our way to replenish our coal supply! Our joy was all the greater because this was so unexpected.

The *Indrani* had all the conveniences of the *Strathroy,* and, in addition, was fitted with a radio. She would, therefore, make an excellent collier for us. It did not take long to make the change in her. Except one machinist who did not mind serving us, which service we gratefully accepted, the rest of the English wandered over to the *Krefeld;* the first officer of the *Rio Negro,* Jalaes, took command of the *Indrani;* Ensign of Reserves Hentschel, two petty officers and four seamen went aboard as the military crew, and the work was finished.

The English captain of the *Indrani* was favorably disposed. When the prize officer received orders from our captain to pass the word to our captured crews he always preferred to go to this captain. He seemed to take precedence over the other captains. Of course, the captured crews were not allowed to have any weapons. But the *Indrani* captain had a shotgun to which he was attached. He therefore requested permission to keep it. It was kept for him on the *Karlsruhe* and returned to him when he left. He was very thankful to our captain for this favor.

The *Indrani* had North American newspapers. They were better than the English, in that instead of the low-down hatred they catered to harmless sensationalism. Of course, they did not lie any less because of this. Much fun was caused by an article in which were described the extensive orders issued by the English Admiralty in regard to finishing the *Karlsruhe.* The ships sent out from England were not to return until our beautiful ship had been sunk. We were not a little pleased to note that we had become obnoxious to the British! In the beginning we often read in the newspapers about our wonderful adventures. In San Juan de Porto Rico we were described as "captured," later on (in any English newspaper) we were "sunk," then again we were only "disabled," and now we again seemed to be hale and hearty, so much so that all the ships that surrounded us—and we knew from their radio calls that there were not less than 22!—were unable to "disable" us. For this purpose four more armored cruisers were sent out. How did we escape them!

The *Indrani* was left behind with the *Rio Negro* and the *Krefeld.* We set out with the *Asuncion* to coal, in much better humor than we were in during the forenoon.

18-19 September.—Protected by a heavy fog we began this coaling. It lasted one day and one night. The next day was a day of

rest for the exhausted crew. Then we headed for our old place north of the Island Fernando Noronha and lay in wait.

20 September.—On the way there we paid a short visit to the *Indrani* and *Krefeld* in order to find out how our English wards were getting along. They had been behaving perfectly. We took the *Krefeld* and *Rio Negro* with us, leaving the *Indrani* behind.

21 September.—We did not have to wait long. On the first morning after our arrival the cheerful report of the lookout told of the approach of a steamer.

We hardly had to move out of our tracks. The steamer headed exactly for us. When she had arrived near enough so that we could make out her flag we suffered a slight disappointment; she flew the colors of Holland. She was the *Maria,* old and rather neglected looking, and was loaded down.

The signal from our prize officer changed our disappointment to joy. The *Maria* was under the charter of a London firm, carrying wheat from Portland (Oregon) to Belfast and Dublin. Ship and cargo were therefore confiscated and liable to destruction.

We figured out that this cargo was sufficient to provide bread for the entire population of London for 14 days, and so we thought: "Whoever digs a grave for somebody else is likely to fall in it himself!"

While the crew of the prize was being transferred and the explosives were being made ready, a second steamer on a southerly course hove in sight to the westward. The *Krefeld* remained with the *Maria* in order to pick up our men after the explosion and to wait for the steamer to sink. The soft-hearted English captains had begged our captain not to send them away again when a steamer was about to be sunk. They also wanted to see this scene! The captain granted their wish.

The *Karlsruhe* then hurried away to attend to the latest arrival. The pipes of the boatswain's mates on watch blew all over the ship: "The reserve prize crew be ready to leave the ship!" Good enough! We certainly had our hands full!

Even at a great distance we could, by means of the telescope, make out in the clear atmosphere the red English commercial flag.

The steamer was the *Cornish City.* Her home port was Bideford. She was bound to Rio de Janeiro with 6400 tons of Cardiff coal for the English Brazilian Coal Co. We were especially pleased with this, because several hours previously the captain of the *Maria*

had told us that the English cruiser *Glasgow,* loaded down with coal, had left *Rio de Janeiro* in order to chase the *Kronprinz Wilhelm,* and that the coal company was now short of coal. The coal we had captured was evidently consigned to the English company that had supplied their cruiser.

The *Cornish City* was an old steamer that had seen much service. We did not have the necessary men to convert her into another collier. As we were well supplied with coal for the present the captain decided to sink this prize.

About half the crew were English, the other half Chinese. They were transferred to the *Rio Negro* that had followed us.

Then the steamer was bombed. She filled rapidly and sank.

The *Krefeld* arrived just in time to witness the sinking.

A very successful day lay behind us. But before the *Cornish City* sank we heard strong radio messages being sent by the English steamer *Amazon.* This was a large passenger steamer of the English Royal Mail S. P. Co. If we captured her this would crown the day. The excitement was intense while the increased lookouts searched the horizon.

Meantime it grew dark. About 10.00 p. m. the lights of a steamer were seen to the eastward. Of course we all had hopes that this was the *Amazon,* and so we gayly pounced on her. As the captain expected to find many neutral passengers on her he decided not to hold her up until daylight.

The night was thick. Heavy rain and squalls passed over us all night. Several times we lost sight of the light.

22 September.—The breaking day brought us a sad disappointment. Ahead of us rolled a small ship heading north. On closer approach she, in order to increase our anger, hoisted the Italian flag.

The steamer was the *Ascaro* of Genoa. She was carrying corn from Rosario to St. Vincent (Cape Verde). Like most steamers of that nation she looked dirty and very neglected. When the prize officer returned from his work he seemed weak in the stomach from the terrible odors that pervaded the steamer.

Her papers were absolutely clear, so we had to respectfully permit her to continue on her way.

But we soon received our reward for the tomfoolery that the Italian had perpetrated on us. While the prize crew was going over to the Italian, a second steamer hove in sight to the north-

westward. She hoisted her flag at once, which we immediately recognized as a beautiful, large and new Union Jack. The Britisher had mistaken us for a friendly cruiser and could not imagine why we were hurrying to meet her. She then hoisted an enormous flag at the masthead so that we could see her better. But soon she seemed to smell a mouse; the red cloth was quickly hauled down and was never sighted again.

The case of this steamer was similar to that of most of the others. They never suspected anything as we steamed toward them, always thinking we were a British cruiser. What else could they meet on the free ocean except warships of the sea-ruling Britannia? They never thought of meeting a German man-o'-war until they saw us hoist our war flag. Later on, however, when the press reports showed that many steamers were disappearing, the English captains seemed to get an inkling of the true state of affairs. After that we occasionally held up a steamer and found that the men had already packed up their clothes and had cleared away the boats ready for lowering.

About 6.40 a. m. we captured the steamer *Rio Ignassa* from London. She was carrying 4800 tons of coal from Newcastle to Rio de Janeiro. The crew consisted entirely of Englishmen.

She was sentenced to be sunk for the same reason that the *Cornish City* was sunk.

While we were doing this a steamer came in sight heading straight for the *Karlsruhe*. When ordered by flag signal she came close aboard and stopped. She carried the Swedish flag, was named *Princess Ingeborg* (Axel Johnson and Co., of Stockholm), was loaded with merchandise and passengers, among them several German ladies and children, and was heading for South America. Her papers were quickly examined and she was then released.

The captain first decided to fill up our bunkers before sinking the prize. But this was given up because of the heavy sea. The English captain assured us that he did not have very good coal and that we would surely soon meet other steamers that would bring us better fuel. This agreed with our own expectations.

The *Rio Ignassa* was bombed in two places, namely, in the shaft-alley and forward in the "collision room." She sank rapidly, heeling over at the finish. This was the first steamer we saw sink in the daytime. Shortly before she heeled over one of her flags broke out and it was the letter "Q" which means: "I wish to

signal you." Of course nobody had remained on board. It was another trick of the bogey man.

This steamer also brought many newspapers. In one of the illustrated papers was a good picture of the sinking of the *Maine*. The ship, about half sunk, continued to fire her guns at her more powerful and more numerous foes. The picture was pasted up in the men's quarters and the necessary remarks added to it.

The press reports that concerned us were now being translated and made up into a sort of ship-newspaper which was distributed among the men.

PAUSE!

23-27 September.—Since leaving the home country the *Karlsruhe* had, barring a few short stops, been underway constantly. The boilers and engines can be called the heart of the ship. In order to keep her well and strong these must be overhauled from time to time.

As all the English warships were, to all appearances, a good distance away, we decided to use several days for this purpose. A surprise by an enemy cruiser would have been fatal to us at such a time because the engines were not ready. In order to prevent a surprise we proceeded a good distance to the westward out of the commercial highway.

The other ships also needed repairs and so they used these days for the same purpose. The ship was pretty badly damaged by the constant coaling. The paint on the side had been worn away and the rust showed through in many places. Very little of the deck linoleum remained. The bare steel came through all over. The first officer did his best to remedy these conditions.

Other than this, these days were much like the days when we lay in wait without sighting anything.

The shark hooks were broken out. The officers amused themselves shooting sharks. During spare hours we hunted places free of coal dust in order to sleep or read.

The best gathering place was still the navigating bridge which was always clean.

As long as the quarter-deck and the remainder of the main-deck was covered with a deck-load of coal there remained only the poop to go to in order to get some fresh air, but even this was no good when the wind blew the coal dust around. As soon as the coal on the quarter-deck was passed down to the bunkers the after

end of the main-deck was thoroughly scrubbed down. Then we had a place "to promenade" and "to Müller" [evidently the Müller physical exercises], of which we were all in need. The captain also enthusiastically joined us in these physical exercises.

After the evening meal the men would gather on the foc's'le, the officers on the bridge, and listen to the music. Our ship's band was gathered after much work before the ship left home. Their performances were better than those of other ships' bands, barring the regularly organized government bands.

Every Sunday the captain held a short service on the quarter-deck. The band then played on the after-deck. Refreshments and cigarettes were also served to the men.

The steamers accompanying us were always invited to these concerts. On the *Krefeld* several hundred Englishmen, Frenchmen, Chinese, negroes, etc., would crowd the rail on the side toward us, all listening to the strains of "Deutschland, Deutschland, über Alles" and the "Watch on the Rhine," which were always sung as a finale. The repertoire of our band was very extensive. The latest opera hits were played as readily as the oldest Prussian ballads.

One day our men got up a real minstrel show on the foc's'le. There were plenty of comedians among them. Their efforts were rewarded by heavy salvos of laughter. One of the mates discovered that he possessed poetical talent, and one day he showed this to an astonished but thankful audience.

And day after day the wonderful sun continued to shine down upon the endless, deep-blue surface as if there were nothing more peaceful than this poor earth. It is a pleasant feeling to wake up in the morning and know that the sun is shining!

The captain would invite several of us to dine with him nearly every evening at dinner, and on Sunday to lunch. Of course, the conversation soon got around to the political situation at home, and from that it was not much of a jump to our relatives. Nobody knew anything definite about his own. The last letters were written at the end of June. This one had a father, that one a brother or brother-in-law in the field. But no one knew on which front they were serving. The captain always drank a toast to the welfare of our loved ones at home.

OUR BEST WEEK

28 September.—After completing her repairs, the *Karlsruhe* proceeded to her coaling place. On the way we met the *Asuncion.* She had emptied the *Strathroy's* bunkers and then sunk her. The *Strathroy* crew transferred to the *Krefeld.*

29-30 September.—While coaling we received the joyful news that the Fortress of Maubeuge had surrendered with 40,000 men, four generals and 400 guns. We even received news of the *Emden* and were very pleased about her successful cruise.

1 October.—Loaded to the limit with coal, we started back to our region of operations on 1 October. The entire main-deck and quarter-deck were piled about 1 meter high with coal. The ship did not ride the high seas very well, vibrating as each large wave passed under her.

2 October.—The following day the *Asuncion* brought as a lot of important telegrams.

Our auxiliary cruiser *Kap Trafalgar* had been sunk. That was a sad message.

Our cruiser squadron was on its way to South America. The English cruisers *Good Hope, Monmouth* and *Glasgow* had started to the southward. We were anxious to learn the result of the events that would soon take place off the west coast of Chili. In addition to those named above, three other English warships had rounded Cape Horn.

A great coal famine existed in Brazil. In the large cities only a limited amount of electric lighting was permitted. The trains had reduced their schedules. (We thoroughly understood the reason for this!) The government had forbidden the export of coal. If, even in spite of this, the English ships left Brazilian harbors "loaded down with coal," then we knew how poorly the neutrality laws were being observed, which must not be ascribed entirely to the bad feelings of the Brazilians but mainly to the pressure which England exerted upon them.

3-5 October.—For two days we lay in wait without results. About noon of the third day the *Krefeld,* that had been sent by the captain several miles to the eastward, sent us the signal: "I have a steamer in sight."

The vessel was steaming to the eastward of the usual trade lane. Therefore she could not have a very clear conscience!

This time the chase lasted two hours. Therefore our joy was all the greater when we received the report: The English steamer *Farn* has 7000 tons of the best Cardiff coal bound for Montevideo from Barry. As the Chinese and German crew of the *Strathroy* had been relieved of their duties, this cargo saved their lives. She would take the place of the *Strathroy*. Lieutenant of Reserves Lubinus would be her new captain.

The captain had planned to send this coal to our cruiser squadron later on when their scene of operations was nearer and definitely known.

According to the story of the captain of the *Krefeld,* the English crews took a great part in the chase of the *Farn*. As soon as they saw the smoke clouds of the steamer they reported the fact to the captain and officers. During the chase they made bets as to the nationality of the steamer. Most of them wanted to bet on the English. When the flag was recognized they yelled in delight. The chase caused as much excitement, and apparently as much pleasure, for the Englishmen as it did for us.

The captain of the *Farn,* no doubt, pulled a long face when he climbed the *Krefeld's* gangway and was met by the sound of his countrymen's voices.

The captains of the steamers living on the *Krefeld* must have had mixed feelings as they watched the undisturbed operations of the German cruiser. They, of course, knew nothing of our worries, the constant lookout for enemy radio messages and the frequent signs of the approach of enemy warships. I wonder what the captain of the *Strathroy* thought, he who had witnessed the *Karlsruhe's* operations since 1 September.

At the beginning, when approached on the subject, the Englishmen aired their views in words somewhat as follows: "Just you wait! Before long our cruisers will be at your heels and then your little hour will come." Finally, however, they lost these hopes. And when anybody reminded them of their "navy" they would bite their lips and commence to swear.

On this very day an English warship patrolling between Cape Verde and South America came in our immediate vicinity. During the night his radio became so "howling" loud that the captain decided to steam several miles to the eastward. We stopped about 30 miles to the eastward of the usual trade lane.

6 October.—This time the *Rio Negro* was lucky. About 4.00 p. m. we received a report from her concerning the English steamer *Niceto de Larrinaga*. The prize crew went over. We, who remained aboard the *Karlsruhe,* pictured the usual procedure. Soon after the arrival of the prize officer the steamer crew would be gathered together. After the reports of the prize officer in regard to cargo, nationality, destination, etc., had been signalled over by the prize quartermaster the captain would signal back his decision: The steamer should be sunk. We pictured the prize officer informing their captain—a biting of the lips and then the usual nod ("All right, sir")—then a word to the gathered crew; all hurriedly disappear below decks. We knew that they were now packing their clothes and trinkets and would soon appear once more. The boats would be stowed and made ready for lowering.

Soon the captain himself would appear, chronometer and other nautical instruments under his arm. He had saved what was really valuable.

The *Niecto de Larrinaga* had a cargo of 8000 tons of oats and corn from Buenos Aires for London. Her crew and provisions went aboard the *Krefeld.* She herself took the road of all her predecessors except those we were using as colliers.

The steamer had a radio outfit. Like all the other steamers, she made not the slightest attempt to call English warships to her assistance, and even though the chase would only last one hour, she must have known that several ships were in the vicinity, and these would have known we were a German cruiser from the message.

We noted in her radio logs that she had been warned of us by the *Bristol.* The cruiser had advised her to steam about 30 miles to the eastward of the usual steamer tracks. It was her bad luck to follow this advice and run right into our arms, because we had gone that far to the eastward to escape the English cruiser.

The English captain was very astonished to be captured in spite of his caution. But he was still more astonished when our prize officer told him that we knew his course and had tracked him out there. Then, he said, we had probably caught the steamer that left Buenos Aires with him and was travelling the same course. The prize officer increased the captain's sorrow by saying that we were unfortunately delayed in capturing another steamer, whereupon the old man harmlessly remarked that we had better wait until morning; there were three of them leaving Buenos Aires at

the same time, and the third one, which was slower than his ship, would surely pass along here.

7 October.—We did not have to wait long for the expected steamer. About 7.00 a. m. she came in sight. We steamed ahead slowly to meet her. She anticipated her fate and hoisted the English flag when still a great distance away. At 8.00 o'clock we stopped the steamer *Lynrowan*. The calculation came out correctly. The captain did not seem to be surprised when the prize officer, this time more truthfully, assured him that we had been waiting for him since yesterday. Soon thereafter he was greeting his colleague on the *Krefeld*. They probably were very angry because the third one, or rather the first one, had had more luck and escaped us!

The captain had his sick wife and a young nurse on board. They were the first feminine guests on the *Krefeld* and were received with a great outburst of enthusiasm.

The *Lynrowan* had a cargo of 5000 tons of corn, sugar and tallow in hogsheads, and 12 automobiles received at Buenos Aires and bound for Liverpool.

The gunnery officer, Lieutenant (J. G.) von dem Borne, had begged the captain to give him this prize as a target for gunnery practice. After the *Krefeld*, with her Englishmen, had disappeared over the horizon, we made a run at extreme range, using target-practice ammunition, and then made several runs at close range using reduced charges.

The steamer *Lynrowan* sank about 3.00 p. m. The cargo hatches burst open when the ship was down deep under the water, and all the buoyant contents of the cargo holds, above all, several hundred hogsheads of tallow, shot to the surface. The captain tried to destroy this extensive field of wreckage by making several runs back and forth across it. But the hogsheads persisted in coming back in one bunch. The sharks gathered at once and fought over the lumps of tallow floating out of the splintered casks. The sharks experienced a rare thing, for these regions, in their hunt for game; numerous fat rats were running around on the casks trying to save themselves from the wreck.

It is not entirely safe to steam over a spot where a ship has recently been sunk. All sorts of wooden articles, such as yards, poles and cargo booms, break loose down in the depths and shoot up to the surface with great force. The force that tears them away down below is sufficient to break the heavy shrouds, etc., that

hold them in place. Even boats often break loose from their lashings and appear on the surface. In order to prevent their playing the rôle of traitors and later on giving away the sinking of the ship, it is advisable to punch holes in them before blowing up the ship. I consider it possible for the heavy timbers shooting up to the surface to actually pierce the ship's bottom.

The Englishmen on the *Krefeld* heard our firing and decided that we were in action. In their agitation they began to cause trouble. The next day the captain had this case investigated. It appeared, however, to have been entirely harmless.

From the Argentine newspapers which we found on board the last two steamers we discovered that Admiral Cradock had taken the *Good Hope* with him to the southward and had therefore shifted his flag. The *Good Hope, Monmouth* and *Glasgow* had remained in Montevideo for several days and celebrated just as they would have done during peace. Cradock and his flag lieutenant, Cumming, were pictured as heroes in all the newspapers. But there is no use in grumbling over the unfriendly actions of the neutral Uruguayans.

8 October.—The first rays of the rising sun had barely begun to paint the eastern heavens red when another steamer was sighted. She set her flag at once but soon hauled it down again when she recognized us. But we did not have to see her flag to recognize the colors of her smoke-pipe—blue funnel with black top and a broad white band—as belonging to one of the English steamers of the firm of Lamport and Holt of Liverpool. We were close aboard her by 7.00 o'clock. On her stern was the proud name *Cervantes.*

The signal of the prize officer told us the following: "4500 tons of cargo, fodder, sugar, hides and wool. The steamer came from South America and is heading for Liverpool. The crew consists of 43 men, practically all of whom are English, including four passengers from Punta Arenas and Rio Grande do Sul." These four were something new and were thankfully received as a welcome diversion.

After these 47 were received by their compatriots and fellow-sufferers in captivity on the *Krefeld*—the transshipment was accomplished very quickly this time because they had all previously packed their clothes—the prize officer went ahead with the blowing-up. He had devised a new scheme (the memory of

Bowes Castle still rankled!): the bombs were secured outboard below the water-line. We all anxiously awaited the result, and this time we were not disappointed. The explosion tore a great hole in her. The steamer sank very rapidly. About noon she painfully rose up out of the water for the last time and then shot stern first down into the depths.

There were now about 300 involuntary guests aboard the steamer *Krefeld*. The captain decided it was time to send these unnecessary eaters away. He therefore called Captain Vieth aboard for a conference. A neutral harbor, not too near, had to be chosen for their landing. The captain decided on Teneriffe as being the best suited for the purpose.

In order to get an idea of the "chaos of races" on the *Krefeld*, attention is invited to the following summary. On the 11 steamers captured since 1 September (excluding *Bowes Castle*) there were:

205 Englishmen (of whom two were women)
8 Finns
7 Russians
1 Belgian
2 Frenchmen

Total of 223 citizens of enemy countries.

107 Chinese
22 Spaniards
10 Hollanders
13 Swedes
4 Americans
2 Italians
3 Chilians
4 Norwegians
1 Dane
3 Swiss
2 Mexicans
1 Ecuadorean
1 Cuban
1 Greek
1 Arab (Mohammedan)

Total of 175 citizens of neutral countries.

All told there were, therefore, 20 different nationalities!

But before the steamer was released another addition arrived. About 11 p. m. the lights of a steamer hove in sight and we brought her to with a blank shot about midnight. In answer to our question she signalled back: "*Pruth* of London."

She had 2300 tons of barley and 3800 tons of saltpeter from Chili and was proceeding to St. Vincent under charter.

We intended to sink the steamer the next day. After sending a watch crew aboard her she remained stopped close to us.

9 October.—Early in the morning the crew of the *Pruth* was transferred and then the vessel was sunk. She sank about 10 o'clock.

Shortly after noon we stopped the Spanish mail steamer *Cadiz*. Her decks swarmed with passengers, and, of course, they all ran to the side towards us in order to stare at us, thereby giving the large steamer a heavy list.

Those passengers capable of judging such things must have wondered concerning the appearance of our ship. The results of the constant coaling could not be erased entirely. There was only one thing as immaculately white as it was during peace times and that was our flag.

They could not help being astonished over the appearance of our cutter's crew. They thought we were approaching starvation. But that was not the way our men looked; the excellent, sufficient and ever-fresh supplies of our prizes agreed with them remarkably well. The sun had burned them a reddish brown. They looked like Indians. We could have used them as medical advertisements. The cutter's crew were not exceptions to the general rule. The all-around physical condition of the men was very good. Had it not been it would have been impossible for them to have stood the strenuous work of coaling and hoisting cargo out of steamers in this glowing heat. Naturally the firemen suffered most from the effects of the heat. Therefore they did not appear to be so robust and full of strength and health as did the seamen. But even among them there were none seriously ill.

The steamer *Cadiz* was released very soon and then showed her gratitude by a vigorous blowing of the steam-whistle which we answered with pleasure. In addition we sent her a flag signal: "Pleasant trip."

10 October.—During the early morning hours we again stopped and released a neutral steamer. This time it was a Norwegian named *Bergenhus*.

The time had come again when we had to plan on filling up our coal bunkers. We headed for the rendezvous of the *Asuncion* and *Farn*.

Our most successful week lay behind us. Our last coaling on 1 October had certainly paid for itself. Since 5 October we had captured a steamer each day.

TAKING LEAVE

11 October.—About three o'clock the following afternoon, as the *Karlsruhe* approached the place where the *Asuncion* waited, the lookout reported three steamers ahead. He was scolded for not being able to count up to three. He refused to change his opinion, and soon we, on the bridge, could make out six mastheads that were soon followed over the horizon by three vessels. One was running away at high speed. The others remained quietly lying where they were. At the same time our radio operator reported that the *Asuncion* was yelling for help as she was being chased by an enemy ship. The running steamer therefore could not be other than the *Asuncion.* We quieted her and soon thereafter she appeared over the horizon.

Meantime the *Karlsruhe* had increased her speed and was rapidly approaching the other two steamers. One of them hoisted the German flag. That was the *Farn!* The other pulled and hauled on the English flag. We had to laugh!

Captain Lubinus then told us the following story: Shortly before the *Karlsruhe* came in sight a steamer appeared at the rendezvous flying the English flag. Thereupon Lubinus hoisted the English flag on the *Farn.* The Englishman hoisted his signal number "*Condor* of London" and asked the *Farn* for her name and destination which he quickly gave. Then there followed a long series of flag signals asking if the *Farn* had any war news, whether she knew anything of the English men-o'-war, etc.

When the conversation was getting irksome the *Karlsruhe* appeared over the horizon. The Englishman and the *Asuncion* had taken us for a British cruiser. The latter then took to her heels but the Britisher did not move. The *Farn* then did likewise as she had recognized us.

We could not ask for a more delightful way of capturing a steamer!

The *Condor* was an ugly ship with a poisonous-green smoke-pipe. But we looked at her with different eyes when we learned what she carried: Merchandise, especially provisions, dynamite, and 150 tons of lubricating oil. She came from New York and was bound for Chili. The captain had been warned of us and had

navigated very cautiously. He had made a great sweep to the eastward of the West Indies and carefully avoided all commercial lanes. He certainly did have rotten luck!

We were especially pleased with the lubricating oil which we could use very nicely as fuel oil. And the provisions also came in very handy, because our own stock, as well as that of our auxiliary, was getting low. The dynamite bombs were a welcome addition to our explosive bombs, which we used for sinking steamers, only a few remaining on hand at that time.

The steamer was therefore captured and all the boats we had were used to unload her. That was not easy, and it took a longer time than we had expected because the oil barrels were on top of the other cargo and had to be hoisted out of the way first. Included in the cargo was a quantity of large window panes. Fortunately we did not have to handle these carefully or there would have been no end to the work.

The crew of this steamer was also wished on the *Krefeld*. Among them were five Germans who were to be enlisted in our service.

12-13 October.—The unloading of the prize lasted the entire following day and the day after that.

After generously providing the *Krefeld* with all the provisions possible she was finally scheduled to be released on 13 October. In the course of the afternoon an officer of the steamer came aboard as representative of the English captains and their steamers' crews. He thanked our captain in their name for all the favors and the consideration shown them, both when alongside the cruiser and when aboard the accompanying ship. The captains would not fail to make reports to their government about this.

At 4.00 p. m. the *Krefeld* started for Santa Cruz de Tenerifa, where she should not arrive prior to 22 October. To celebrate the leave-taking she hoisted an especially large flag and then made a turn around H. M. S. *Karlsruhe* and the other steamers. We had our band on deck and played the piece that is usually played when German seamen part from each other: "Musz i denn, musz i denn zum Städtele hinaus." [Translator's Note: This is not pure German. Literally translated: "Must I then, must I then go away from the village?"] And then the steamer that had shared our joys and sorrows for a month and a half slowly disappeared from sight. She took our mail with her. After two months our relatives might now get some word from us for the first time.

About 10.00 p. m. we had finished transshipping the oil from the *Condor*. We could not blow the ship up because of her dynamite cargo. So we had to content ourselves with opening her valves and breaking in her side-ports. This last precaution hastened the sinking very much. At each roll great quantities of water streamed through these ports into the hull of the ship until finally the ports reached the level of the water. And then the steamer ended the struggle in a very few minutes.

The *Rio Negro* was detailed to await the finish. The *Karlsruhe* and the *Farn* had started off to coal.

14 October.—While on the way we lighted our oil-burning boiler, in order to test the mixture of lubricating oil and petroleum. The result was, on the whole, very pleasing.

15-16 October.—Not since the beginning of the war was the *Karlsruhe* so well provided with fuel as she was on 16 October when, having finished our coaling, we set off to waylay some more steamers. We had 180 tons of fuel-oil and 1500 tons of coal on board, of which 1100 tons was the best Cardiff coal. This entire load of fuel came from our prizes. The supplies, brought along by our steamers, had hardly been touched.

17 October.—When we met the *Rio Negro* the next day her captain reported that hardly 10 minutes after the sinking of the *Condor* two extremely heavy dynamite explosions took place. The steamer must have been down to a considerable depth by that time. The concussion was so strong on the *Rio Negro,* even though she was several miles away from the sunken steamer, that the compass cards jumped from their spindles.

Soon we met the *Asuncion*. This steamer had discovered the surprising but pleasing news that the Fortress of Antwerp had fallen. This must have been a heavy blow to England. All the newspapers had said that Antwerp could not possibly be taken, so now they could not minimize the importance of this victory. In spite of that, however, the English did try to do this, as we discovered later on.

18 October.—We had just reached our old place to the northward of the Island Fernando Noronha when the lookout reported a vessel in sight. We caught up with her in an hour. It was the English steamer *Glanton* of London.

"Thirty-seven hundred tons of coal from Cardiff for Montevideo for the firm of Wilson and Sons, crew English," read the signal from the prize officer. "Steamer is captured, prepare to

sink her" was the prompt reply of our captain. We did not need the coal at this time, and we had no men to spare to man the steamer.

The *Rio Negro* succeeded to the duties of the *Krefeld* and took the crew and all the provisions of the prize on board.

As the *Glanton* was rising from the sea for the last time and then disappearing to the never-to-be-seen-again regions, a second steamer was sighted and the chase began at once. But it was the Dutch steamer *Zaanland* from Amsterdam. We had no reasons for doubting her movements or appearance. The captain permitted her to proceed without even stopping her. The same thing happened to an Italian that we saw late that evening.

19-22 October.—Although we had met three steamers on this day, the next three days passed without any successes at all. The *Rio Negro* and *Karlsruhe* drifted around, engines stopped, hunting the horizon until our eyes got tired.

On 22 October, in honor of the birthday of our Empress, we celebrated by having "Sunday routine." After a short religious service the captain addressed the crew. He eulogized this Imperial Lady, mother of her country, and her devotion as leader of the Red Cross, setting a wonderful example to all German women. He reminded them also of the fact that she was a real German mother that had the same worries as other mothers had, in that she had six sons and one son-in-law, all of whom were in the field. Three spirited and heartfelt "Hurras" thundered over the deep blue depths below the equator in honor of our Empress and the Imperial Family.

On this day the result of our deeds would be spread from Tenerifa to our homes and to the entire world! Each one thought he had to remind the others of this fact.

We waited the whole day hoping for an Empress'-birthday prize. When, about 10.00 p. m., we sighted the lights of a steamer we thought our hopes had been fulfilled at the last hour. But the vessel was found to be the Swedish steamer *Atlant* of Gothenburg that was heading to the southward. We had to let her proceed, and did it without even stopping her.

23 October.—As a reward for our unsuccessful chase, the next day brought us the English steamer *Hurstdale* from Liverpool with 4600 tons of corn bound from Rosario to Bristol. She made little work for us. Just as she was half sunk and making her last efforts to resist her doom, another steamer was reported, but

this time it was a Swede. She was the *Annie Johnson* of Gothenburg. We stopped her but set her free immediately.

24 October.—Due to the arrival of our prize crews at Teneriffe, the Englishmen must now know of our operations on the northeast coast of South America, and the manner and means in which we increased our coal supply and planned our future operations. We could therefore assume that our beat which we had patrolled since 1 September would be carefully searched in the near future.

As a matter of fact, in these days we once more recognized the radio signals of the English warships which cruised in our immediate neighborhood for the first time in a long while.

When we were going south from the West Indies the captain had an idea that it would be a good thing to shake up the many English and French colonial possessions in the Lesser Antilles. He especially had in mind a joke on the French island of Martinique and the English Barbados. But at that time he had to give up these plans because he was not sure of his coal supply. Now, however, he had taken up this scheme once more. You can imagine how pleased we all were about this.

Aside from the fact that the English would now carefully search our scene of operations up to this time, there now remained but little chance of our capturing any more enemy merchant ships. The experiences of the past month had taught us that the English steamers were not using the main travel lanes very much. All of them were making great detours. The number of neutral steamers that we met increased considerably.

Therefore the captain decided to leave our old place for a while until the shipping quieted down again, and to suddenly bob up in the West Indies to carry out the aforementioned little jokes.

25 October.—We gathered all our steamers about us, *Rio Negro, Asuncion* and *Indrani.* Each one received detailed instructions for the next few weeks. Then they were released. The *Farn,* our collier, was the only one to follow us on our cruise to the northwestward.

VANDYCK

26 October.—We had proceeded a good distance away from the active lanes of travel to South America when on the morning of 26 October, to our great surprise, the lookout reported a steamer bearing east-southeasterly, steering a northerly course. When we saw her high white upper-works we knew from a distance that she was a passenger steamer. Then we recognized the colors

of the smoke-pipe—the sign of the firm of Lamport and Holt. The steamer was stopped about 11 o'clock. It was the *Vandyck*, the third largest steamer of this company, over 10,000 tons displacement and only three years old.

The daintiest morsel had fallen most unexpectedly at our feet!

In addition to 210 passengers, of which 112 were in the first or second cabin, mostly North Americans, the steamer had 130 bags of mail, $2500 of the firm's funds, a large cargo of general merchandise and about 1000 tons of frozen meat. She was bound from Buenos Aires to New York via Trinidad and Barbados.

She had been warned against us by the *Bristol*. The captain had exercised great caution in that he ran darkened at night and did not use his radio for six days. Therefore he was most surprised when our prize officer very seriously told him that we had been waiting for her since yesterday!

Her captain was an old man and he lost his balance due to this misfortune. We always gave the crews of our prizes the choice between being quartered aboard the *Karlsruhe* as prisoners of war or of signing an agreement not to take part against us or our allies during the rest of this war. If they elected the latter, we promised to set them free as soon as the next opportunity presented itself. Up to this time all the Englishmen had signed the agreement without hesitation. When this agreement was submitted and explained to the crew of the *Vandyck* the old captain made an exciting speech to his men. The prize officer found it necessary to report this to our captain. The latter immediately sent two armed men aboard the steamer to take charge of the captain. Meantime, however, his more level-headed officers had quieted him so that this measure was not necessary. This was the only case of an English captain trying to create a disturbance.

The passengers had, until the very last moment, taken us for an English cruiser. When they discovered their mistake there arose a grand howl. Because of the senseless infamy heaped upon our armies by the South American press (under English-French control) the passengers had expected the worst possible treatment and robbery at the hands of the "Huns." This madness was not confined to the between-decks passengers, who are usually of ordinary and uneducated extraction and who, therefore, may be excused because of their ignorance. Among the first-class passengers was the Columbian diplomatic representative to Argentine, a mestino, with his wife and child. He had had the foresight

to request our ambassador in Buenos Aires to write a letter to the commanders of all German warships. This he presented to our prize officer, and, shivering from head to foot, he begged that he, his wife and child, be spared! He did not subside for a long time, even after the captain had sent Ensign Count Beissel to the steamer to attend the diplomat and his wife.

When the passengers finally understood that we had no idea of hurting a hair on their heads nor of taking their property, the astonishment was great and the gratitude effusive.

In order to give the passengers ample time to pack up, the captain delayed unloading the steamer until the next day. Meantime all our henchmen were recalled by radio and they arrived one after the other. Those on the *Vandyck* were certainly surprised to see the swarm of ships floating all around.

The transfer of baggage was to commence at 6.00 o'clock the next morning. The passengers were permitted to eat one more comfortable noon meal on the *Vandyck* on the 27th. Then they were to follow their baggage over to the *Asuncion* and, along with the crews of the last three steamers, be taken to a neutral harbor.

As our provision supply, such as fresh meat, flour and rice (the last was necessary for the Chinese) had been considerably reduced, the wonderfully supplied steamer came in very handy. Therefore the next day was to be devoted to a wholesale transfer of provisions.

27 October.—During the night a part of the crew, especially the firemen, got drunk. This had usually happened in the case of the other steamers if the men were given sufficient time to save as much of their rum as they could. A drunken sailor from one of these steamers jumped overboard and it took considerable trouble to fish him out again.

Another thing that usually happened aboard the ships was the fact that as soon as a steamer was captured the officers lost control of their men. They would then besiege the captain demanding that they be paid and attempting to break into the stores, especially if they thought these contained alcohol. In several cases the prize officer had to intervene in order that their captain would be obeyed.

The first officer of the *Vandyck* had requested permission to superintend the transfer of the baggage. He and the other ship's officers behaved very sensibly, and did their best to lighten our work and to do what they could for the unfortunate passengers.

The ship's boats had been packed full the day before. Promptly at 6.00 a. m. the first officer directed that they be lowered. The passengers were watching this work and saw a most surprising spectacle: all the wooden boats of the large and new passenger steamer were leaky and soon filled with water so that all the baggage was thoroughly soaked. The suffering passengers raged. They cursed the first officer and then the captain until they were finally quieted by the officers of the *Karlsruhe,* who were watching the performance.

The German steamboat then took the heavy, wet boats in tow and, about noon, the transportation of baggage was finished.

After the noon meal the transfer of passengers to the *Asuncion* began. They were all aboard her by 7.00 p. m., including the crews of the steamers *Glanton* and *Hurstdale;* also a 10 days' supply of provisions.

The *Asuncion* was a much smaller steamer than the *Vandyck* and was not fitted to take care of so many passengers. The women and children were all assigned cabins, but as there were not enough of these, the captain and the ship's officers surrendered their rooms to them. The men had to find places on deck as best they could.

The captain had a notice posted in the salon and in the steerage. In this notice he invited attention to the lies that had been published in the press which had caused so much uneasiness among the passengers. German soldiers and sailors would never rob an unfortunate traveller of his property, much less attempt to take his life. In regard to the English, this might be the case, as they paid their naval officers and seamen prize money, that is, with the property of strangers. This custom, dating back to the days of piracy, was unknown to the German Navy. The German Navy was accustomed to doing its duty which required us to capture enemy steamers and to treat neutral passengers with every possible consideration. The only real way to escape inconveniences was to travel, not on English, but on neutral steamers.

This notice was read with interest and then widely discussed. Taken full and by, the opinions of the passengers were not bad. They accepted the inevitable in their predicament. They gave a letter to the officer who had charge of their transfer in which they thanked him for his courteous treatment: "No one with reason could expect more under the circumstances."

The presence of two American newspaper reporters was not an unfortunate thing at this time.

The women and children begged for souvenirs and especially wanted *Karlsruhe* cap ribbons and uniform buttons.

After the *Asuncion* had received our mails, Captain Fritch was ordered to take her to Para. He was to arrive there on 1 November. Captain Fritch was very sorry to have to leave us. He asked me to tell the captain that he would much rather share the joys and sorrows of the *Karlsruhe*.

The transfer of provisions from the *Vandyck* continued through the night. Shortly before midnight lights were sighted. It was a steamer heading directly for us, so that we hardly had to move in order to stop her. We were not a little pleased to discover that she was an English vessel by the name of *Royal Scepter* from London. She had noticed the gathering of ships. That pleased her so she decided to find out what was happening here in the middle of the ocean. She ran straight into our arms. Unfortunately, however, she had a very valuable neutral cargo of coffee. This was estimated to be worth about 5,000,000 marks, while the steamer herself was an old and worn-out craft. The captain decided, with a heavy heart, to turn her loose. About 1.30 a. m. her lights disappeared from sight.

28 October.—Early in the morning, about 6.30 o'clock, the steamer *Vandyck* went to the bottomless depths.

THE END

29-30 October.—The *Karlsruhe* with her three remaining steamers set out for the West Indies. On both the following days the bunkers were filled from the *Farn* and, on 1 November, we filled up again. Then the *Farn* was left behind while the *Rio Negro* and the *Indrani* followed us.

2-3 November.—In addition to the jokes on the English and French colonies, the captain had decided to institute proceedings to create uneasiness in the steamer-lanes between the English Barbados and Trinidad.

The island of Barbados was chosen as the first objective. We knew that several large liners which we intended to sink would be in this harbor. Nothing would be more effective than such an undertaking to hurt the cause of England in America and the West Indies. We were all anxiously awaiting the events of the next few days. Never before was the morale on board better than

during this period. The crew had not been told as yet of our plans. But to get an idea of what the men thought let me relate the following story: My boy (servant) had been seriously ill with malaria which he had contracted in Mexico. He had just recovered from a severe attack and was released from the sick-bay. When I asked him how he felt he did not answer my question but said, "The sinking of steamers is very nice, but time is hanging heavily on our hands. It is high time that our guns got a chance to do something. That would be some diversion."

That is what all our men on the *Karlsruhe* thought.

This good humor called forth on 4 November a small feast in our mess, although there might have been another reason in that our cook had, after a long wait, finally received fresh butter, frozen poultry and other costly food supplies from the *Vandyck*. The first officer directed that red wine be served. Our mess room was decorated with the potted plants and flowers taken from the salon of the *Vandyck*.

4 November.—About 6.30 p. m., on 4 November, H. M. S. *Karlsruhe* was in latitude 10° 7′ North, longitude 55° 25′ West.

It was in the hour just preceding the short tropical twilight. The captain and the watch officer, Lieutenant (J. G.) Freiherr von Althaus, and the helmsman and signalman of the watch, were on the navigating bridge. The men had finished supper and were gathering as usual on the foc's'le to listen to the ship's band that had assembled under the bridge. The commissioned officers and the warrant officers were still at dinner in their mess rooms in the after part of the ship where were also the deck, engine-room and fire-room watches, boys, stewards and cooks.

The steamers *Indrani* and *Rio Negro* were following the cruiser at a short distance.

The first officer had just risen from the table and some of the officers had decided to leave the after end of the ship and go up on the cooler bridge, when we felt a heavy shock, followed by a dull cracking and gnashing as the ship shuddered. The electric lights went out.

The ship immediately took a heavy list to port.

Somebody in the officers' mess yelled "Torpedo hit!" This idea was mechanically conveyed from one to the other. We hurried to our battle-stations.

Before I could reach the poop, my station as second gunnery officer at "general quarters," I heard the call, "Close water-tight doors!" and the customary five short strokes of the ship's bell.

Ahead of our bow I saw the bottom of a floating ship which sank immediately. I thought it was some strange craft with which we had had a collision, even though this seemed impossible to have occurred. Actually, however, it was the forward half of our own ship.

A powerful explosion had blown H. M. S. *Karlsruhe* into halves.

The place where the explosion occurred and the immediate neighborhood, which included that part of the ship from the bow to the forward smoke-pipe, also the navigating bridge and fore-mast, must have been blown to atoms. No one saw a piece of it.

The forward part, with the majority of the crew, sank after a very few minutes. Only a few men, most of whom had been thrown a good distance away, could be saved by the after end of the ship and their boats. All of them were more or less seriously burned or mutilated.

The after end, in which all the water-tight doors had been closed, remained afloat for about 20 minutes. This fact, a glowing testimonial to our ship's material and the German construction, was the main reason we few remaining ones were saved.

The two accompanying steamers saw the catastrophe, saw a column of flame 100 meters high, and hastened to do all they could; they came up at high speed and lowered all their boats.

Our own boats were quickly lowered and assisted the steamers' boats in searching the unfortunate spot for any survivors.

After the first officer and the engineer officer on watch had inspected all the lower compartments in the ship and had made sure that there were no more aboard, the last boat, full of officers, left the ship. We had hardly gone 100 meters from the ship when her stern lifted straight up out of the water so that we could distinctly see her propellers and rudder. The boats were still hunting for swimmers, but when the rest of H. M. S. *Karlsruhe* shot suddenly down to the depths all the men in the boats gave three "Hurras!" to her and to our comrades.

Then all was quiet in our little circle. A heavy load of pain and sorrow lay upon us, and before us were the questions: How? and Why?

These questions will never be answered.

The catastrophe had befallen us so suddenly and with such force that we had no time to make clear estimates of the reasons

or results. By and by when all the survivors were assembled on the *Rio Negro* and it was seen how many of our comrades were missing, and when it was settled beyond doubt that our captain, that excellent man, honored and respected by all, had drowned with our good ship, then we all began to understand the extent of our losses and how hard this accident had hit us.

Each man on board ship had made up his mind that the end of our war cruise would come some day, and all hoped that it would be in battle with the hated enemy, proving that German patriotism and devotion are not empty words. How else could the end come?

THE RETURN HOME

The search for survivors of the sunken vessel was given up as useless on the following morning.

What should be done next?

The answer was not hard to find. There were two courses of action open to us: We had to make an effort to place ourselves and our men at the disposal of our Fatherland as soon as possible. Also we had to conceal the loss of the cruiser as long as possible. The English could not possibly know of it, Lord be praised! The excellent work of H. M. S. *Karlsruhe* had severely damaged the English trade on the North Atlantic Ocean, causing no end of uneasiness. Until the arrival of our cruiser squadron, which was very indefinite as yet, there was no other ship available to replace our cruiser. The sinking of H. M. S. *Karlsruhe* would relieve the pressure on the English and then all the results of our work would have gone to naught at one stroke. But if we were able to keep her loss a secret the uneasiness in English commercial circles would continue for another month. A considerable number of English warships were detailed to search for us, which was another advantage for our cruiser squadron.

The idea of trying to join the cruiser squadron was dropped. We were soon unanimously of the opinion that we should attempt to break through to Germany.

There were several ways of carrying out this plan. We might proceed to some neutral American harbor and then each individual could have undertaken to make the dangerous trip back home. Or we might proceed on our own steamers direct to Europe and attempt to go straight to Germany.

After a short argument we decided on the latter course. Getting back via America was very doubtful. We did not have the neces-

sary clothes. Our outer garments were so noticeable (uniforms) that we would most certainly have been recognized and interned. We also had read in the newspapers that the English did not hesitate to take German citizens and people of questionable citizenship off neutral ships. Above all, however, the minute we arrived in a neutral harbor the secrecy of the *Karlsruhe's* loss would be broken. Even if our hundred-odd men were able to keep absolute silence—past experience had taught us how difficult this really is!—we still could not expect that much of the Chinese on the *Indrani*. This last consideration decided the question.

We could now divide our crew between the two steamers. If one were captured we still had a chance for the other half to get through. Should the English capture both steamers—we were absolutely helpless!—that would have been fine business for them; and we could not begrudge them that chance.

So we decided to sink the *Indrani* as soon as we had thoroughly filled up for the long cruise. Then the *Rio Negro* steamed northward.

While underway we picked up a variety of reports, good and bad. Our cruiser squadron had won a victory over the English at Coronel; the efficient *Emden* had met her end.

As we steamed into the northern latitudes the scarcity of clothes was felt. Of course, the steamer crew helped us out most willingly as far as possible. But we were too many for them.

Our seamen made clothes for themselves out of old canvas and woolen coverlets. The results, however, were more apparent than real; the men looked picturesque, some like characters in fables, some like comedians, but all froze just the same.

We had decided to head for Norway and wait there until we picked up some reports and news (for instance, concerning the English watch in the North Sea and the Skagerrak) and then act accordingly, *i. e.*, whether the individuals would proceed home overland via Norway and Sweden, or whether we would take our steamers on in to Kiel or Wilhelmshaven.

Not having received any important reports, and without having sighted a single enemy vessel, we arrived at a Norwegian harbor in the forenoon of 29 November after a journey of practically four weeks.

We had broken through! The English blockade lines were behind us. Were the efficient Britishers asleep? Or was it the bad weather and the high seas which we experienced that were

too much for their famous seamanship? All our dreams of the barbed-wire fences around English prison camps had vanished.

I chose to continue my journey overland with Ensign of Reserves Eyring. There was always danger that the steamer *Rio Negro* might be taken on the last leg of her cruise. It was not possible for our men to make the overland trip in their clothes without exciting suspicion, so they had to be taken along on the steamer.

I wanted to make sure that I would safely reach home with the most important reports, especially my war diary which, except for a few official papers that I was able to rescue on 4 November, constituted the only record of the cruise and fate of the *Karlsruhe*. On 4 December, a beautiful sunshiny winter day, the two of us arrived on German territory at Sasznitz and were arrested by the first German landsturmer that we met.

A few days later we heard the good news that the *Rio Negro* had dropped anchor in German territory.

ROSTER OF OFFICERS ON H. M. S. *KARLSRUHE*

Order of Seniority	Rank	Name	Duties and Other Remarks
1	Commander...	Erich Köhler.....	Commanding. Died 4 Nov., '14.
2	Lieutenant	Studt.....	1st Officer.
3	"	Thierfelder.....	Navigator. Later commanded "Kronprinz Wilhelm."
4	Lieut. (J. G.)..	v. dem Borne.....	Gunnery Officer.
5	" ..	Aust[1].....	Adjutant.
6	" ..	Wilhelm Schröder.	Torpedo and Prize Officer.
7	" ..	v. Althaus.....	Radio Officer. Died 4 Nov., '14.
8	Ensign.....	Kurt Schwarz.	
9	"	Vanselow.	
10	"	Dittmer.	
11	"	Count Beissel v. Gymnich.	
12	"	Eyssen.	
13	Eng. Lieut.....	Grabe	Chief Engineer.
14	Eng. Lt. (J. G.)	Merk.	
15	Eng. Ens.....	Beck.	
16	Lt. (Doctor)...	Warnecke	Ship's Doctor.
17	Pay Lt. (J. G.)	Meinhardt.....	Ship's Pay Officer.
18	Lt. (Reserves)	Frese.....	Rec'd from "Kronprinz Wilhelm."
19	Ens. "	Eyring.....	Rec'd from 'Kronprinz Wilhelm."
20	" "	Hentchel	Rec'd from "Kronprinz Wilhelm."
21	" "	Hoppe.....	Temporarily aboard from auxiliary cruisers.
22	" "	Gundlach..... ..	

[1] Author of this book.

LIST OF STEAMERS CAPTURED BY H. M. S. *KARLSRUHE*

No.	Name of Steamer	Flag	Displacement. Registered Brutto tons	Character of Cargo	Value of ship in Marks[a]	Date of Capture (1914)	Remarks
1	Bowes Castle...	English.	4,650	Saltpeter and silver metal.	1,500,000	18 Aug.	Crew landed at Maranhao, Brazil, on 2 Sept., '14.
2	Strathroy.....	"	4,336	6,000 tons coal.....	816,000	31 Aug.	Crew landed by "Krefeld" at Teneriffe on 22 Oct., '14.
3	Maple Branch...	"	4,338	2,000 tons mdse. and live stock.	918,000	3 Sept.	Same.
4	Highland Hope.	"	5,150	Ballast (refrigerating plant)	1,428,000	14 Sept.	Same.
5	Indrani.....	"	5,706	6,700 tons coal.....	1,264,000	17 Sept.	Same.
6	Cornish City....	"	3,816	6,400 tons coal.....	693,600	21 Sept.	Same.
7	Maria.....	Dutch (English Charter).	3,804	Wheat.....	?	21 Sept.	Same.
8	Rio Ignassa.....	English	3,817	4,800 tons coal.....	612,000	22 Sept.	Same.
9	Farn.....	"	4,393	7,000 tons coal.....	877,200	5 Oct.	Entered San Juan de Porto Rico under German prize crew, 12 Jan., '15.
10	Niceto de Larrinaga.....	"	5,018	8,000 tons fodder, corn, oats, machinery parts.	1,264,800	6 Oct.	Crew taken to Teneriffe on "Krefeld."
11	Lynrowan.....	"	3,384	5,000 tons corn, sugar, tallow, hides, 12 automobiles.	591,600	7 Oct.	Same.
12	Cervantes.....	"	4,635	4,500 tons fodder, wool, sugar, furs.	714,000	8 Oct.	Same.
13	Pruth.....	"	4,408	3800 tons saltpeter. 2300 tons barley.	?	8 Oct.	Same.
14	Condor.....	"	3,053	Mdse. including dynamite and 150 tons lubricating oil.	408,000	11 Oct.	Same.
15	Hunstdale.....	"	2,752	4600 tons corn.....	?	23 Oct.	Crew taken to Para on "Asuncion."
16	Glanton.....	"	3,021	4000 tons coal.....	?	18 Oct.	Same.
17	Vandyck.....	"	10,328	Mdse. and 1000 tons frozen meats.	4,896,000	26 Oct.	Also had 210 passengers on board.
		Total	76,609	More than	15,984,000		

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

COMMON SENSE IN WAR[1]

By SPENSER WILKINSON
Chichele Professor of Military History, Oxford

There have been of late discussions on the subject of the proper use to be made of the fleet, discussions which reveal uncertainty about the aim and scope of naval warfare. The report of the Dardanelles Commission disclosed uncertainty of this kind among those who, during the term of the late government, had authority over the conduct of the war. That the functions of the fleet should be a matter of doubt, especially in high quarters, is nothing less than a national danger, for a mistaken employment of this powerful and costly force might lead to defeat and even to the collapse of the cause of the Allies and of the British Empire.

The objective of a navy is the enemy's navy. This fundamental principle was laid down independently of each other by the two clearest thinkers who have written systematically about naval warfare, by Admiral Philip Colomb in his "Naval Warfare," and by Captain Mahan in his "Influence of Sea Power upon History." In the judgment of these two writers, so long as a hostile navy exists, no objective other than that navy can be pursued, except at a hazard which ought not to be run. What does a man mean when, speaking of war, he refers to risks that ought not to be run? Is not war made up of danger, of risk, of hazard? How are we to know what risks are to be taken, and what not? That there is a line to be drawn is shown by the opinion of the masters of the business. "Do not imagine," wrote Nelson, on the 2d of July, 1804, "I am one of those hot-brained people who fight at an immense disadvantage without an adequate object." "Battles ought not to be given," wrote Napoleon, on the 21st of August, 1809, "unless one can reckon in one's favor 70 chances of success out of 100." In other words, the general or the admiral who

[1] Reprinted by consent from *The Nineteenth Century and After*, September, 1917.

of his own accord engages in battle without a reasonable certainty of success does not know his business. An attack of ships upon forts is an operation which naval writers regard as tabooed. It is an improper use of tools. It is employing ships for a purpose for which they are not suited. A ship is like an eggshell full of men and machinery; a comparatively small number of hits by great projectiles will sink it, a sufficient number of explosions of smaller projectiles will cripple the machinery and disable the greater part of the crew. A ship offers a large, visible and vulnerable target. Fortifications on land are made to stand a great deal of pounding, even by heavy projectiles. A land battery offers a target only a few feet high, difficult to distinguish and very hard to hit. It may be hit a great many times without damage to the guns, which will probably be invisible and almost impossible to locate. Accordingly, the damage which may be inflicted on the fort is quite incommensurate with the loss which will probably be suffered by the ships. Common sense, therefore, suggests that the experiment should not be undertaken. Its most probable result is that a number of ships and men will be lost for nothing, and the consequence is likely to be not only defeat in the engagement but the loss of forces which might, had they been preserved, have turned the balance in some sea fight upon which the issue of the war possibly depends. The risk which ought not to be run is that of losing not only the battle but the war.

The attack by ships upon forts being forbidden by common sense, it seems incredible that any government should order such an operation. Yet this tabooed experiment was three times undertaken by the late government. The result of these and of subsequent operations was so disastrous that Parliament took the extraordinary step of passing an act which ordered a commission to inquire into the origin, inception and conduct of the operations in and about the Dardanelles, and which enjoined the publication of the commission's report. The first installment of the report had the effect of emphasizing the doubt in the public mind concerning the fitness of the organization of the government for the conduct of the war. But it did not relieve the doubt by the suggestion of a better system, so that the problem was not solved. The commissioners began their report by pointing out that they would exceed the scope of their functions if they were to examine the measures necessary to remedy the administrative defects revealed

by their inquiry. They ended it by the suggestion that any member of the public who might read the report should draw his own conclusions. This was probably the right course for a commission, which has neither the machinery of judicial procedure, inasmuch as those whose conduct is the subject of the inquiry are not represented by advocates, nor the peculiar kind of skill which is the qualification for scientific investigation. Moreover, the commission is still at work, and its report is far from complete. Yet what the nation needed and desired was to discover the defects in its system of government for the purpose of carrying on the war, and the remedy for those defects. I venture then to ask the reader to accompany me in accepting the commission's invitation to use the materials supplied in its report in an attempt to find out how the mistake came to be made, and how such mistakes can be prevented.

In every war all the important decisions are made by the supreme executive authority, which is responsible to the nation for them. It stands or falls by success or failure in war, naturally enough, for the nation stands or falls by the issue of a war, an issue for which it always holds its government responsible. Everyone else simply obeys the government. In our constitution the executive power, vested in the King, is exercised according to the advice of the Cabinet, and for that advice, which means for every act of each member and of all his subordinates, the Cabinet is responsible to Parliament. There are thus only two responsibilities, that of the Cabinet to Parliament, and of every official, including every single Minister, to the Cabinet. The decisions that fix the size of the army and navy, that determine how much of the army or navy shall be used in each theater of war, who shall command each portion, and what mission he is to fulfil, are decisions of the Cabinet as a body. But these decisions, taken together, constitute the conduct of the war. None of them is ever taken except with the sanction of the Cabinet, and if any of them were challenged in the House of Commons and condemned by that body the Cabinet would fall.

How, then, can a Cabinet rightly decide such technical questions as the number of battleships, or of divisions, to be kept, the choice of theaters of war, of objectives and of commanders, and the force to be placed under the orders of each of them? Just in the same way as a man decides his own affairs when they involve professional skill. He chooses a doctor, a surgeon, or a lawyer; listens to what the professional man proposes, and then decides to the best of his common sense whether he will take the medicine, consent to the operation on his child, or proceed with the action in chancery. The Cabinet in the same way considers the suggestions made by its generals or admirals, and decides to adopt, to reject, or to modify them. The members of the Cabinet have to make up their minds as best they can as to the skill of their naval and military

officers, and to back their judgment about them and their ideas by staking the national existence on the issue.[2]

The usual practice of a large committee is to have any important branch of its work prepared by a special sub-committee. When war broke out in August, 1914, the pre-existing arrangements had been thrown out of gear, partly by troubles arising out of Irish affairs, and partly because the principal military officers were told off to the expeditionary force which was sent to France. But new arrangements were quickly improvised, by which business connected with the conduct of the war was entrusted to two sub-committees. One of these, called the War Council, consisted of 12 members, of whom seven were members of the Cabinet, and the others were Mr. Balfour; the First Sea Lord, Lord Fisher; Admiral Sir Arthur Wilson; the chief of the Imperial General Staff, Sir James Wolfe Murray; and the Secretary, Lieutenant Colonel Sir Maurice Hankey. This War Council is perhaps not quite accurately described as a sub-committee of the Cabinet, because a minority of its members were not Cabinet Ministers. But for practical purposes the distinction does not matter. For the War Council the business was prepared by a small sub-committee, a triumvirate, composed of the Prime Minister, Mr. Asquith; the Secretary of State for War, Lord Kitchener; and the First Lord of the Admiralty, Mr. Churchill.

This triumvirate was a close approximation to the ideal arrangement for the management of a war. In 1892 Sir Charles Dilke and I, in an essay which represented the results of our joint study of "Imperial Defence," reached the conclusions that

> the first requirement of a sound system is a general who can be entrusted with the duty of advising the Cabinet upon the conduct of war, and with the actual management of campaigns. To have such an officer is indispensable, for it is an elementary truth that war can never be well conducted by a committee. . . . . Any satisfactory Admiralty system will provide a competent naval adviser for the Cabinet. . . . . We attach the highest importance to the common action of the military and of the naval authorities in the consideration of Imperial defence. We doubt, however, whether it will be possible to secure unity of design in defence so long as the War Office and the Admiralty are separately represented in the Cabinet.[3] The difficulty would be overcome if it became the practice for one Minister to hold both offices.

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[2] *Westminster Gazette*, May 29, 1915.

[3] This refers not to the professional advisers but to the political heads of the two existing offices.

Our great object was, if possible, to put before those who had charge of the national affairs a conception of defence which embodied views as to which there was full agreement between those who had devoted special attention to the subject. The passages just quoted proved to fulfil this condition, and in February, 1894, a memorandum was sent to the leading statesmen of all parties bearing the signatures, not only of the authors of "Imperial Defence," but also of General Sir George Chesney and Mr. Arnold-Forster, at that time the most eminent representatives in Parliament of the effort to induce the nation to make reasonable preparation for possible conflict. The substance of that memorandum was the following passage:

> In order to secure the special consideration by the Cabinet of national defence as distinct from and superior to the administration either of the navy or of the army we would suggest the appointment of one and the same Minister to the two offices of Secretary of State for War and First Lord of the Admiralty, or the amalgamation, with the consent of Parliament, of these two offices.
>
> We would further suggest that the Cabinet should select for each service an officer whose professional judgment commands its confidence, to be at once the responsible adviser of the Cabinet upon all questions regarding the conduct of war so far as his own service is concerned, and the principal executive officer of that service.
>
> We understand by a responsible adviser one who stands or falls by the advice which he gives. He would, of course, have at his disposal, in the formation of his views, the best assistance which the professional staff of the navy or of the army could supply. But the opinion which, after mature consideration, he would submit to the Cabinet and formally record, would be his own, and would be given in his own name.[4]

The objects proposed by the authors of this paper were, first, that the Prime Minister himself should attend to the national business of the preparation and conduct of war and, secondly, to find some means of securing that the principles of war should be constantly kept before him.[5] He was to have the best pro-

[4] "Imperial Defence." 2d Edition. Appendix II.

[5] I use the phrase "principles of war" because it was a favorite expression of Napoleon's throughout his career. Sometimes he spoke of the "high" or "sublime parts of war" and sometimes of "my system." Of all these terms the modern name is the theory of war. What the theory of war is and what service it can render to the nation I discussed in a lecture delivered at Oxford in February, 1916 (published under the title "The Way to Victory" by Messrs. Constable and Co.), to which I venture to refer readers interested in a subject which cannot be properly treated in the space here at my disposal.

fessional advice, of which the only possible meaning is that his advisers should be exponents of the principles or theory of war. Everything depended, of course, upon the distinctness with which each of these advisers should realize that his function was to be the representative of the theory, or, in other words, of the knowledge and experience of which the Great Staff, in the one case of the Admiralty, and in the other the War Office, must needs be the repository.

As a fact, the War Office and the Admiralty were in full possession of the theory and of its application to the problem of the Dardanelles, which was indeed familiar to all persons who had paid any special attention to the subject. The Dardanelles, the Bosphorus, and the Gallipoli Peninsula are among the famous places of the world, familiar to readers of history and travels. In 1807 a British fleet made its way through the Dardanelles past the forts, and reached Constantinople. There the admiral found himself unable to do anything against the city, and reluctantly made his way back through the Dardanelles, with heavy loss. In 1836 the Dardanelles were surveyed for the Sultan by a Prussian captain, von Moltke, who expressed the opinion that, if the forts were properly armed, no fleet could ever pass them, and that to land an army and take the forts in rear would be far from easy. This opinion was well known, for its author was afterwards the greatest general of the nineteenth century, and his account of the Dardanelles was published in a popular and widely read volume. In 1896 professional opinion on the subject was summed up as follows:

> It would not be difficult to a civilized power so to fortify the Dardanelles that their passage by a hostile fleet would be impracticable, and that the works covering them would form a first-class fortress not to be taken, except after a protracted siege.[*]

In 1914 there was every probability that these fortifications had been put in order during one of the periods when the late Field Marshal von der Goltz was a pasha supervising the Turkish Army. At the end of 1914 there was a further probability that the attention of the Turkish Government had been specially directed to these forts by the brief bombardment of the outer forts carried out on the 3d of November under orders from the Admiralty given without the knowledge of the War Council.

[*] *National Review*, November, 1896.

In quite recent times the War Office and the Admiralty had more than once caused the problem of forcing the passage of the Dardanelles to be carefully studied. In 1904 Lord Fisher satisfied himself "that even with military co-operation the operation was mightily hazardous." In 1906 the General Staff at the War Office reported that "military opinion, looking at the question from the point of view of coast defence, will be in entire agreement with the naval view that unaided action by the fleet, bearing in mind the risks involved, is much to be deprecated." In September, 1914, Mr. Churchill, as First Lord of the Admiralty, ordered, with Lord Kitchener, that two naval and two military officers should work out a plan for seizing the Gallipoli Peninsula (with a Greek army) in order to admit a British fleet into the Sea of Marmora. A day or two later he received a military memorandum saying, "An attack upon the Gallipoli Peninsula from the sea side (outside of the Straits) is likely to prove an extremely difficult operation."

Thus, the two offices concerned had fulfilled their function of applying the theory of war to the particular problem with which we are concerned. The War Council appears to have been not quite so happy. In December, 1914, its Secretary circulated to the members of the War Council a memorandum, in which it was suggested that there was a deadlock in the western theater of war, and that Germany could best be struck by a blow directed in the first instance against Turkey. The report of the commission tells us that at this time the members of the War Council, apparently the professional members, were divided into two schools, one of which held that all efforts should be concentrated in the western theater of war, at any rate until it was proved beyond doubt that there was there no possibility of success, while the other held that a fresh campaign should be opened against Turkey and Austria. There can hardly be a doubt as to which of these two schools was inspired by the theory of war. Napoleon, writing at St. Helena about the campaign of 1800, said:

> A plan of campaign ought to have foreseen all that the enemy can do and contain the means of frustrating it. In this campaign the frontier of Germany was the predominant frontier; the frontier of the Riviera of Genoa was the secondary frontier. The events which might happen in Italy would have no direct, immediate, and necessary action upon the affairs of the Rhine, while the events that might happen in Germany would have a necessary and immediate action upon Italy. Consequently,

the First Consul united all the forces of the Republic on the predominant frontier.

In January, 1915, not only was the western front the predominant frontier, but it was the only frontier upon which all the forces of France and England could be united. The proposal for operations on a large scale through Turkey, attributed by Lord Fisher to Sir Maurice Hankey, and, apparently, favored by Lord Fisher himself, violated the first principle of war, which is to concentrate all efforts both in time and place.

At the beginning of 1915 the German assaults in the west had been checked. Their great attacks on Ypres had failed. But the new armies which were forming in England had not yet taken the field. In the east the Russians had the better of the Austrians, but were not doing well on the Asiatic frontier of Turkey. Bulgaria was neutral, and there was reasonable uneasiness about her possible attitude.

The bombardment of the forts of the Dardanelles was begun on the 19th of February. It was authorized by the Cabinet on the 17th or 18th of February, when "the Prime Minster conveyed to the Cabinet the unanimous decision of the War Council. It was accepted by them without question, criticism, or discussion of any kind." The decision of the War Council which the Cabinet thus endorsed without question was formed at two meetings. The first was held on the 13th of January. On this occasion

Mr. Churchill said that he had exchanged telegrams with Vice Admiral Carden, the commander-in-chief in the Mediterranean, in regard to the possibilities of a naval attack on the Dardanelles. The sense of Admiral Carden's reply was that it was impossible to rush the Dardanelles, but that in his opinion it might be possible to demolish the forts one by one. His proposal was first to concentrate his fire on the entrance forts. After they were demolished he would proceed to deal with the inner forts, then attack from the Straits and from the sea side of the Gallipoli Peninsula. The plan was based on the fact that the Dardanelles forts are armed mainly with old guns of only 35 caliber. These would be outranged by the guns of the ships, which would effect their object without going into range.

Mr. Churchill gave details of the force to be employed, and went on:

The Admiralty were studying the question, and believed that a plan could be made for systematically reducing all the forts within a few weeks. Once the forts were reduced the mine fields would be cleared, and the fleet would proceed up to Constantinople and destroy the *Goeben*.

Lord Kitchener thought the plan was worth trying. We could leave off the bombardment if it did not prove effective.

There was, apparently, no other speech. Lord Fisher, Sir Arthur Wilson, and Sir James Murray remained silent, and the decision was taken in the following terms: "The Admiralty should prepare for a naval expedition in February to bombard and take the Gallipoli Peninsula, with Constantinople as its objective."

The second meeting of the War Council was held on the 28th of January. The decision taken was identical with that adopted at the first meeting. So far as can be gathered from Sir Maurice Hankey's note, of which one version appears in the commission's report, and further details in that of Mr. Roch, Mr. Churchill advocated and Lord Kitchener supported the measure proposed. The arguments used are recorded as follows:

Among the advantages claimed for it were that

(1) It would cut the Turkish Army in two.

(2) It would put Constantinople under our control.

(3) It would finally settle the attitude of Bulgaria and the whole of the Balkans. (This appears to have been said by Lord Grey.)

(4) It would give us the advantage of having the Russian wheat, enabling Russia to resume exports (this would restore Russian exchanges which were falling owing to her inability to export, and causing great embarrassment).

(5) It would open a passage to the Danube.

(6) If successful, its effect would be equivalent to that of a successful campaign fought with the new armies.

(7) One merit of the scheme was that if satisfactory progress was not made the attack could be broken off.

Mr. Balfour, in dwelling upon the advantages which would accrue from a successful attack on the Dardanelles, concluded by saying that "it was difficult to imagine a more helpful operation." Mr. Churchill then said that the naval commander-in-chief in the Mediterranean had expressed his belief that it could be done. He required from three weeks to a month to accomplish it. The necessary ships were already on their way to the Dardanelles. The real difficulties would begin when the outer forts had been silenced, and it became necessary to attack the Narrows. . . . . He explained the plan of attack on a map.

Nothing more was said relevant to the operation. The project was not criticized, and all the naval officers were silent.

It is quite intelligible that those members of the council who had had no training in the science and art of war should be impressed with what was said at these meetings. Mr. Churchill's speech on the 13th, giving the views of Vice Admiral Carden, must have seemed, in the silence of the admirals present, to represent the professional opinion of the navy. There was no one to tell the council that the notion of the naval guns demolishing the forts while out of range of them was in flat contradiction to the views of coast-defence officers, which seem to have been represented in the War Office paper of 1906. The silence of the admirals was taken to imply approval, and rightly so, for all the non-professional members had been members of the Committee of Imperial Defence, where it was well understood that the silence of a naval or military officer implied concurrence with the view expressed by his political chief. The political members might perhaps discount Mr. Churchill as one of their own class. But he appeared to be speaking for the Admiralty and to represent the naval judgment; above all he was warmly supported by Lord Kitchener, whose force of character and great reputation lent immense weight to whatever he said. Thus the plan was carried without criticism, and no one seems to have noticed that of the seven advantages claimed the seventh was not very promising, and the other six were chickens that could hardly be hatched before the taking of Constantinople, a feat that no one can have thought likely to be accomplished without an army. The naval officers who were present have subsequently been examined by the commission and have excused their silence on the ground that it was not their duty to express disagreement with the First Lord of the Admiralty. But in that case what was the use of their presence? What was its object if not to ensure that the theory of naval war in its application to the plan proposed should be brought home to the political members? What escape have they from the dilemma that either they had not mastered the subject, or, if they had, had sat silent while a wrong decision was made?

The moral to be drawn from these two meetings is that the direction of the naval and military forces of the Crown cannot safely be left to a committee of political leaders, however distinguished, without an adequate guarantee that before they make a decision they will have had before them an analysis based upon a sound theory of war, naval or military.

It remains to examine the working of the triumvirate, in which the Prime Minister's function was to keep his mind open to the military and naval judgment of which the Secretary of State for War and the First Lord of the Admiralty were the official exponents. The cases of these two officers were not identical. Mr. Churchill, not being a naval officer, could have no judgment of his own on naval matters entitling him to a voice in the council. His proper function was to be the mouthpiece of the Admiralty. The organization of the Admiralty had, since 1894, been modified for the purpose of securing sound strategical advice to the government, and the order in council regulating its business had added to the other duties of the First Sea Lord the function of strategical adviser to the government. He had subsequently been provided with a special staff to assist him in the performance of this function. These arrangements imply a specific and formal mode of procedure. If they meant anything it was that naval opinion should be ascertained, formulated and transmitted to the First Lord by the First Sea Lord and by no one else. He might ask for or receive help from his subordinates and call upon them for information or opinions. But every paper would pass through his hands, and if forwarded by him to the First Lord would bear his endorsement. For the purpose of the war the Board of Admiralty was superseded by a "War Staff group," of which the First Sea Lord was the professional head. Indeed, Lord Fisher's authority at the Admiralty was so strong as to amount to a dictatorship against which a protest was afterwards made by the other Sea Lords.

Yet the commission's report reveals Mr. Churchill directly obtaining opinions from a number of Lord Fisher's subordinates and taking just so much of them as suited his own views. No one who reads the commission's report can doubt that, so far from trying to ascertain what the best naval opinion was, Mr. Churchill exerted himself to obtain opinions favorable to his plan and to make the most of them. Sir Henry Jackson, for example, agreed with the proposal for an experimental bombardment of the outer forts, but did not wish to go further until the results of this attempt were seen. He deprecated any attack on Constantinople by the fleet. His was one of the judgments considered by Mr. Churchill as favorable to the project, but it certainly did not justify an operation "with Constantinople for its objective."

It is well within the mark to say that Mr. Churchill was not a channel through which the naval judgment could reach the Prime Minister undistorted.

The official position of the Secretary of State for War had long been that of a channel between the military judgment of the War Office and the Cabinet. For many decades the Secretary of State had been a purely political personage, and the War Office was reorganized in 1904 in order to provide him with a strategical adviser, the Chief of the Imperial General Staff, assisted by a special subordinate, the Director of Operations. But the appointment of Lord Kitchener made an end of this system. Lord Kitchener had the rare distinction of "being himself, alone." The opinions he expressed were his own; they were not representative. During an active career he had been occupied chiefly in administration, for the most part in the east, so that he was unfamiliar with British institutions at home, with the modern organization of the War Office and the army and with the Territorial Force, which he mistakenly treated as inferior to levies which were raised under the name of "new regulars," so that the unique opportunity of embodying all the forces into a homogeneous army was lost. He had never been a great student of war, and his experience in the field was confined to the African campaigns in which he made his name. His views were those of a shrewd good sense little tinged by science, theory or system. The commission was told that he "acted as his own Chief of Staff"; in other words, he ignored the War Office except as the instrument of his wishes. Thus he was the last man to convey to the Prime Minister the information or the military opinions that had during 10 years of devoted work been accumulated by the General Staff at the War Office. Sir James Wolfe Murray, in January, 1915, Chief of the General Staff, had held that office for only a few months and could not be in a position to express opinions independently of such a Secretary of State as Lord Kitchener. Lord Kitchener's share in the purely naval attack on the Dardanelles can be briefly told. On the 2d of January, 1915, a telegram was received from Petrograd asking for a demonstration to draw off the Turks from the Caucasus. Lord Kitchener saw Mr. Churchill and sent him a note saying:

> I do not see that we can do anything that will seriously help the Russians in the Caucasus. . . . . We have no troops to land anywhere.

. . . . The only place that a demonstration might have some effect . . . . would be the Dardanelles.

Next day Lord Kitchener telegraphed through the Foreign Office a reply to Petrograd promising that a demonstration would be made. Lord Kitchener's attitude at the War Council has been described and it is evident that his opinion favorable to the plan made a strong impression on the Prime Minister. But light is thrown upon his position by a paper which he read to the War Council in May, 1915:

When the Admiralty proposed to force the passage of the Dardanelles by means of the fleet alone, I doubted whether the attempt would succeed, but was led to believe it possible by the First Lord's statements of the power of the *Queen Elizabeth* and the Admiralty Staff papers showing how the operation was to be conducted. . . . . I regret that I was led to agree to the enterprise by the statements made, particularly as to the powers of the *Queen Elizabeth*, of which I had no means of judging.

But the Secretary of State for War had every means of judging whether the *Queen Elizabeth's* or any other ship's guns could alter the conditions of naval attack on forts, especially in the narrow channel of the Dardanelles. The papers existing in the War Office, to which reference has already been made, gave him all the means needed.

My endeavor has been to find out the exact nature of a failure in the work of a government. That has involved an examination of the action of distinguished men. But it is not hostile criticism. Each of us is here to serve his country to the best of his powers. The difficulty is that the ablest men are the most overworked. While Lord Kitchener and Mr. Churchill were advising the Prime Minister about the operations of the war, each of them was also general manager of one of the largest business concerns in the world, which was expanding at an unprecedented rate. Besides that, each of them was a member of Parliament and of the Cabinet. Neither could give more than a fraction of his time to the close study of the operations of the war. Lord Fisher, as First Sea Lord, had a responsibility for a large part of the business of the Admiralty. The first condition of a clear strategical judgment is that a man must concentrate himself upon the direction of the operations to the exclusion of everything else. He must be free from other cares. Before we censure the men who have had to take the responsibility for ordering campaigns and battles by sea or land, let each of us try to imagine himself in their place. War

cannot be conducted except by men of strong will, nor without mistakes, and it has been well said that those who are afraid of the mistakes they may make never do anything. In the same way, however, those who are afraid of criticizing when the object is to find the truth may be diverted from their path. So I return to my inquiry.

I have said that the attack of ships upon forts is contrary to common sense. This statement perhaps requires modification. What common sense tells us is that the government in directing the naval and military operations must conform to, and not violate, the principles of war. But common sense unaided does not tell us what those principles are. When a portion of the fleet was ordered to bombard the forts of the Dardanelles, Mr. Asquith did not know, and Mr. Balfour did not know, that a principle was being violated. No voice was raised in the War Council to say: "What you propose to do runs counter to all the experience of wars, and everyone who knows thoroughly what can be done with ships, guns and earthworks, will tell you that ships are not made to fight earthworks, and that you are making an experiment which is morally certain to end in disaster." The defect in the system was that, in the various bodies which one after another discussed this plan until it was finally adopted, there was no one who possessed such a knowledge of what ships, guns, earthworks and men can and cannot do, under given conditions, and of the experience of past wars, as to be able to say, "This operation is a wrong use of forces, and the whole history of modern war is a warning against it," and who combined with this knowledge and the judgment resulting from it, the official and unmistakable duty of pressing that judgment upon the committee of which he was a member. If the country is to have any security that the best use will be made of the forces which, at so much sacrifice, have been placed at the disposal of the government, if it is to have a guarantee that its men, its money, and its ships will not again be thrown away in vain, either in parts or entirely, means must be taken to ensure that, before the government issues instruction either to the army or the navy, the orders proposed shall have been submitted to the scrutiny and shall have obtained the approval of someone who is master of the principles of war.

The remedial measure by which the required guarantee can be secured is not far to seek. It has been set forth in the course

of my argument and consists in adopting the principles about which there was agreement in 1894 between those who had then long examined this problem as the vital part of any national organization for war. Sir Charles Dilke, Sir George Chesney and Mr. Arnold-Forster have long been dead, as have most of those eminent naval and military officers, such as Admiral Hornby, Lord Wolseley, Lord Roberts, Colonel Charles Brackenbury, General Sir Henry Brackenbury, and General Sir Frederic Maurice, with whom we repeatedly discussed these subjects, and who, we believed, were in substantial agreement with us regarding the matters now in question, though we did not think that it accorded with the best traditions of the discipline of the services that we should seek the signature to our manifesto of any officers on the active list. It seems to me a duty not only to those who are now fighting for the country, but also especially to those with whom for many years I was closely associated in the effort to induce our statesmen to set in order the machinery of government for the conduct of war, to recall and to apply to that momentous business principles which we were agreed in recognizing as sound, and which, so far as I am aware, have never been questioned by those whose knowledge and experience gave weight to their opinion. Many years ago I endeavored to work out with as much exactitude as possible the application of these principles, first to the army, and afterwards to the navy.[1]

More than one step since then taken by successive governments was in the right direction. The creation at the War Office of a General Staff, whose chief was to be the strategical adviser of the government, and the modification of the order in council regulating the duties of the Board of Admiralty, by which the First Sea Lord was given the duty of naval strategical adviser, were approximations towards a sound method. But in each case a serious error was committed, of which it is indispensable to point out the nature. The essence of great achievement in all the higher branches of action, especially of intellectual action, is division of labor, with a view to concentration of effort. This is the basis of all good organization, both of knowledge or thought, and of action. The theory, art or science of the general direction of armies or navies in war, the science or art which is called strategy, is in its practical application one of the most difficult in the world. To master it is

[1] "The Brain of an Army," 1890; "The Brain of the Navy," 1894.

a life's effort, to apply it an all-absorbing occupation, requiring a mind as far as possible freed from other preoccupations. The man who undertakes it must be wholly devoted to it, so as to have leisure to throw his whole soul into it. He must be free from the distracting influence of irrelevant interruptions. Strategy must be his profession, for it is not a mere abstract science, it involves the application of the practical judgment, of faculties of which the full development requires action. For the fundamental impulse of the strategist is to design operations and to direct them. His mission is not administrative but executive, and in order that his execution may be as perfect as possible, he must be free from the absorbing and distracting cares of administration. The military and naval life of 99 officers out of 100 gives them neither the opportunity of practicing strategy nor the leisure to study it. The man who gives words of command to a battalion or to the officers of a ship is not practicing strategy, and as a rule has nothing to do with it. It is the constant experience of military historians and of governments that an officer who is a brilliant leader of a brigade or of a division may prove utterly incapable of the responsibility of command-in-chief, and of the two greatest generals of modern times, Napoleon and Moltke, it is almost literally true to say that neither of them ever gave a word of command in his life. When the office of Chief of the General Staff was created, its holder was made First Military Member of the Army Council, and was thus the professional head of the board which administers the army. In this way he was placed at the same time at the head of two distinct professions, that of the strategist and that of the military administrator. But no man can serve two masters, and there is no escape from the dilemma that the Chief of the General Staff may be either a first-rate administrator or a first-rate strategist, but that it is hardly possible that he can be both at once.

When the duty of strategical advice was given to the First Sea Lord, that officer was the professional head of the whole naval administration. He was the senior member of the Board of Admiralty, and all important questions arising in the departments of his colleagues were submitted to him. Upon this more than sufficient mass of business was superimposed the function of the strategist. The dilemma in which the Chief of the General Staff is fixed is imposed also upon the First Sea Lord. Moreover, the

fact that in each case two activities of a totally distinct nature are required from a single officer makes it difficult rightly to select an officer for the post. Is he to be chosen for administrative gifts or for strategic judgment? In the one case, naval or military administration, in the other, the direction of the army or navy in war will suffer. In peace, every government regards the administration as of primary importance, because the first care of a government in peace is apt to be to satisfy the House of Commons that there is no extravagance in expenditure. But in war, a nation's first need is victory, and both the design of victory and the supervision of the execution of that design are functions not of the administrator but of the strategist.

What is required is the selection for each servce of an officer whose duties would be, subject to the higher authority of the Prime Minister, to draft and to issue the orders of the government to all the generals or to all the admirals entrusted with the command of fleets or armies. His duty would be to submit his plans to the Prime Minister, and through him to the Cabinet, to translate them into orders and to issue those orders. His title matters little. I think the simplest would be that of Director General of Military or of Naval Operations. He would be chosen for his strategical judgment, his mastery of the theory and practice of naval or of military operations. His occupation would be with those operations and nothing else; with the naval or military administration he would have no direct concern. He should have his own office, into which he should remove those branches of the existing War Office or Admiralty which, under the name of General Staff, have to do with the operations of the navy or of the army. He should be subject to no First Lord of the Admiralty or Minister of War, but should be in direct relation with the Prime Minister and the Cabinet. The administration of the two services would be left to the Admiralty and the War Office, each of them under an administrative officer or board, and if need be, under a Cabinet Minister, as at present. The two directors general should have their offices near to one another, so that they could readily communicate with each other.

There should be no intermediary between them and the Prime Minister. The secretariat of the Committee of Imperial Defence was instituted in 1904, with the idea that the secretary should consider all questions of defence and furnish advice. That is the

attempt to create a hybrid, a strategist who shall be at the same time a master of land and sea warfare. It is a dangerous and doubtful experiment, of which the result can only be a new dilemma. The secretary will either be a mere clerk, or he will dominate both the services, conducting the war and governing the country. In the second case it would be better that he should at once be appointed Prime Minister.

I am well aware that the objection will be raised that it is difficult to find men of the character and qualifications required for the direction of the naval and military operations. If that were true, the British Empire would be in a bad way. My answer to it is: "Seek and ye shall find," and that if in the past mistakes in the choice of men have been made, the explanation may be that those with whom the choice lay were not quite clear as to the exact nature of the qualifications needed.

The question as to the precise relations of the directors of naval and military operations to the supreme political authority of the Cabinet is perhaps delicate. On that point I am not acquainted with any discussion in the English literature of war. My own view that the military strategist should himself be a member of the government was expressed in December, 1899, on the eve of those disasters in South Africa which so startled the nation as to gain for the period when they happened the name of the Black Week. On the 14th of December I wrote:[*]

> A nation that is liable to war requires men of war in its government; and, in the case of Great Britain, the place for them is in the Cabinet. The traditional practice of having a civilian Minister inside the Cabinet with all the authority, and a soldier with all the knowledge outside the Cabinet, was devised for electioneering purposes, and not for war. The plan has answered its object very well for many years, having secured Cabinets against any intrusion of military wisdom upon their domestic party felicity. But now that the times have changed, and that the chief business of a Cabinet is to manage a war, it seems unwise to keep the military judgment locked out. Party felicity was valuable some years ago when there was a demand for it; but the fashions have changed. To-day the article in demand is not eloquence nor the infallibility of "our side," whichever that may be; the article in demand to-day is the organization of victory. That is not to be had at all the shops. Those who can supply it are very special men, who must be found and their price paid. The nation has given bail for the production of this particular article, and if it is not forthcoming in time the forfeit must be paid. The bail is the British Empire.

[*] "Lessons of the War" (Constable, 1900), p. 93.

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

FORECASTS AND REALITY IN THE NAVAL WAR[1]

By ROMEO BERNOTTI, Capitano di Fregata, Italian Navy
Translated by ALLAN WESTCOTT, Instructor, U. S. N. A.

I. NAVAL DELUSIONS

The War of the Nations gives the outward impression of a revolution rather than an evolution in methods of naval warfare. To speak frankly, the impression seems widely current among people of intelligence that the war has quite discredited the science of naval warfare as propounded prior to 1914; while a large part of the general public are persuaded that it has demonstrated the failure of navies. One of the advantages supposedly inherent in sea power was the ability to transport troops to strike the enemy at his most vulnerable points. If the Dardanelles campaign had succeeded it would indeed have constituted a most obvious proof of the direct influence of sea power upon the course of the war; on the other hand, a superficial examination of the actual situation might appear to justify the opinion expressed several years ago by one of our army writers in confuting the well-known book by Callwell: "Sea power, while often useful, may sometimes be harmful, leading to erroneous diversion and useless scattering of land forces." Notwithstanding the enormous superiority of the Allied fleets over those of our adversaries, the former cannot count to their credit any striking and conspicuous achievements, which may be confidently proclaimed as notable contributions toward the attainment of our objectives in the war. If the inability of Germany to hold her colonies must be conceded as due to naval power, still it is always possible to apply the words of Napoleon in an analogous situation: "Pondicherry may be reconquered on the banks of the Vistula."

Two fundamental advantages accruing to the Allies from preponderance of sea power are the absolute interdiction of enemy

[1] From the *Rivista Marittima*, August, 1917.

trade and the maintenance of our own maritime communications, making it possible to continue the struggle as long as necessary, with land forces steadily augmented, and to carry supplies whereever needed, until in the end we may impose our will on the enemy.

The sceptic will suggest, however, that while the first of these advantages undoubtedly bears heavily upon our adversary, its ultimate efficacy must not be exaggerated. Mahan, in the introduction of his classic work on *The Influence of Sea Power,* in order to demonstrate the effect of cutting off the sea trade of a country in which it is intensively developed, cites, as a typical example, Holland in the disastrous 18 months' war with England in 1653-54; the Zuyder Zee became a forest of masts, the land was reduced to dire misery, and Holland was constrained to a ruinous peace. But it will not do to compare Holland with the great Central Powers, rich in resources of all kinds, and strengthened, moreover, in their capacity for resistance by the occupation of important territories and by their Balkan alliances, creating, in spite of the efforts of Allied forces to break the cordon, a complex of peoples stretching from the North Sea and the Baltic to Mesopotamia.

Scepticism is evidently less justified in regard to the second advantage, that conferred upon the Allies by the maintenance of sea communications, which is for us a factor of absolutely vital importance; but it may be asserted that the means employed to protect sea trade have not measured up to the needs. Clearing the seas of isolated German cruisers and destroying at the Falklands the squadron victorious at Coronel, were indeed tangible proofs of naval superiority; but it will doubtless be said that Germany's failure here was due to the fact that in the initial phase of the war she clung to old principles, and did not, during the first seven months, have recourse to the submarine in commerce warfare.

At all events, note the way the submarine scythe has cut into the line of transports. Recent losses are indeed somewhat less than at the opening of the unrestricted U-boat campaign; transportation is now controlled to secure maximum efficiency; measures and systems of protection are steadily becoming more logical and effective; the munitions output is constantly increasing; the United States has entered the field; admitting, as we have reason to presume, that the combined effects of these measures will assure to the Entente the tonnage necessary to make up for future losses

and guarantee the prosecution of war to victory—nevertheless, judging from appearances, it would be foolish to say that in taking measures of the kind noted above the navy has played the part of protagonist in the war. The antidote for the submarine has not yet been found; protection of sea routes against the insidious foe is secured essentially by grouping in convoys, arming of merchant vessels, and escort. And, as regards this last point, it will be said that escort of merchant vessels by torpedo craft, however numerous, has a practical value somewhat like that of moral character in human affairs; while the submarine is forced to submerge, it will be asserted that it is seldom seen in time to prevent effective maneuvering for torpedo attack.

Submarine attack on communications appears, among the various kinds of naval activity, the only one that has had a direct effect upon the course of the war; and, in contrast with the very tangible way in which its work is manifested, it is difficult to appreciate the effectiveness of counter-measures.

People in the Allied countries note that the maintenance of an immense patrol force of all types requires unceasing labor, extremely fatiguing and dangerous, treachery thwarted, enemy attacks warded off, mines destroyed, unremitting vigils in home and enemy waters, difficulties hampering all these activities—and the actual accomplishments often unknown and their value unappreciated.

If we turn to consider the work of the navies as manifested in fleet actions, no one will deny that in size Jutland was the greatest naval battle in history. But the objective of the German fleet in putting to sea is still wrapped in mystery, and both sides claim tactical victory, while the ultimate effect of the sanguinary conflict upon the course of the war does not readily appear.

We have now touched upon the principal aspects of the present naval war.

Many valuable ships have been lost, through treachery, through defeat, and sometimes as a result of actions that have worked little harm to the enemy. Great is the activity of patrol boats, torpedo craft, and scouts; yet the submarine still scores frequent victims.

The submarine and the mine, if they have not paralyzed the main fleets, have still forced them to remain normally in ports well protected by nets and barriers, so that in this war their character-

istic employment seems to be *inaction;* the naval engagements have been most sanguinary, but seemingly sterile.

How can we compare this warfare with what we imagined before 1914? The logical answer seems to be that of a German writer after the first few months of war: "If we consider what has happened on the sea, we cannot suppress an ironic smile at the predictions of naval strategy; fundamental principles are overthrown, every theoretical forecast is vanity, and the totally unforeseen has become reality."

The more justified seems this irony when we reflect that while Germany herself, in her miraculous preparation for war, gave considerable attention to the development of the submarine, this development was slight as compared with what has taken place during hostilities, whether in respect to numbers, scope, or field of action. The vast submarine campaign is itself one of the improvisations of the war.

After having devoted to the fleet so large a part of our national revenues, we discover it to be a veritable delusion, or we are forced to acknowledge that means which are relatively more effective are far cheaper, *i. e.,* submarines, mines, swift torpedo craft and airplanes. Battle squadrons, in fact, might almost seem organisms tolerated merely because they exist; though in reality it is always easy to see the matter in a very different light simply by reflecting that, held in a potential state at opportune strategic points, *these squadrons serve, if in no other way, to paralyze those of the enemy, which, without the equilibrium thus established, would presumably not rest innocuous.*

While recognizing the validity of this fundamental axiom, if for no other reason than to exclude the paradoxical concept that battleships are useless, there are those who would employ it in order to draw therefrom an apparently brilliant corollary for "after the war."

Their idea is as follows: Admitting that battle fleets are necessary to offset each other, it will be seen that if no battle fleets existed, precisely the present equilibrium would still obtain. Thus, for the future, there rises the mirage of an international convention, forbidding the construction of ships-of-the-line, while leaving nations free to provide for their naval defence by other means. The mirage is most seductive, since it seems to lead by a reasonable step toward the utopia of complete disarmament.

Let us see if this idea is acceptable.

I have sought to present as logically and impartially as possible the arguments suggested by this delusion in regard to naval power; these arguments should be discussed; if their fallacy is demonstrated, they should be cast aside, lest they lead us into evil.

I shall limit myself to a few general considerations, which seem sufficient to prove that the actual effects of naval superiority are greater than appearances indicate, and sufficient also for a summary examination of the changes brought about by the war in the light of prior predictions.

II. THE CHARACTER OF THE WAR

What is the opinion of well-informed critics as to the naval action of Germany at the outbreak of war? Were the German naval objectives realized?

The First Lord of the British Admiralty stated in the House of Commons, in November, 1914, that at the opening of hostilities, England was in grave peril; "and the greatest danger was that of being surprised unprepared, with the fleet not disposed in readiness for war." Once the fleet was mobilized and properly stationed, the danger was over.

These words were not exaggerated.

At the beginning of the war (as to-day) the German fleet was considerably inferior to the British fleet in home waters; but it should not be forgotten that the quota of forces held in complete readiness in time of peace modified this difference in a sense favorable to Germany. In other words, Germany held a larger part of her fleet in permanent preparation for war; and a war opened by a surprise naval attack on her part offered better prospect of success than could be expected later on.

It is beyond question that this surprise action, the possibility of which constituted the chief preoccupation of the British, might have had serious results; aside from other considerations, now that we are in a position to appreciate the unforeseen and extraordinary contribution of England to the land war, who will lightheartedly affirm that nothing would be different in this respect if a great naval battle had at the start transposed the relative strength of the two chief fleets?

The great naval surprise was not attempted by Germany, not certainly because of unwillingness (for it would have accorded perfectly with her spirit and interests) but because of its impossibility, owing to the fact that on the very day of Austria-Hungary's *ultimatum* to Serbia the British Navy had carried out a complete practice mobilization, and could equip her reserve and dispose her squadrons before the outbreak of war. The weight of British naval superiority thus thrown on the scales of war, Germany was forced to avoid risking her main fleet under adverse conditions, and must await the outcome of events, seeking in the meanwhile to weaken her opponent by vigorous attacks on her navy and sea communications—"neglecting nothing," as Bernhardi wrote in 1913 (*Germany and the Next War*), "which might in any wise injure the enemy, accompanying the most ardent initiative by the boldest offensive." And this period of waiting, according to the author just cited, would continue until "at last we shall be able to challenge Great Britain on the high seas." (We shall take up later the prospect of a great naval engagement in the course of the war.)

The consequences, as we have just outlined them, which followed the prevention of aggressive naval action on the part of Germany, are in harmony with the rapid decision sought by the German armies on the western front. The battle of the Marne stopped the German invasion; but, contributing to this result, an event of not less importance was the establishment of British naval superiority in its complete efficiency, it being clear that without an initial naval situation favorable to England "the transport of troops to the Continent," according to the statement of the First Lord in the speech already cited, "would have been prevented or at least retarded"—and every one knows there was no time to lose.

From a naval standpoint, the situation of the Central Powers is exceptional; their coasts, of slight extent, are by nature and art invulnerable. *For a war of attrition, the conditions presented were ideal;* the German and Austro-Hungarian fleets had a freedom of action which it would be folly to assume in similar cases for nations very differently exposed to naval attack. Whatever their inferiority to the enemy, the problems presented to these fleets were of a purely aggressive character—it was possible for

them to run no risks and remain safely passive until the opportune moment for action. It is essential to take account of this special situation in order to appreciate the labor of the Allied fleets in the war, and *to avoid generalizations that would be completely absurd.*

The moment past when, prior to or at the outbreak of war, the German fleet might have attempted a surprise, it remained for the Allied navies to blockade the enemy fleets in the North Sea and Adriatic, capture isolated enemy vessels elsewhere, and profit by the liberty of action thus secured.

Upon the failure of the German plan for a quick decision on land, the war became long and severe; and as an effect of its increased length, the influence of naval superiority took on a value it would not otherwise have had.

In ante-bellum discussions of the effect of sea power in a possible war between the Entente Powers and the Triple Alliance, naval writers as a rule spoke too abstractly of the advantages to be derived from control of the sea; military critics correctly pointed out that these advantages would be felt only in a long war. What importance could be attributed to the isolation of the enemy from the rest of the world in a war of from two to six months?

At the maximum, the war was not expected to last more than a year. "Opinions as to the duration of the war," I find in an important work by a French writer (Captain Sorb, *La doctrine de defense nationale,* 1912), "are divided; some say the campaign cannot be ended in less than six months; other say a year; but we believe that a period of about a month will bring a decisive action, with irremediable consequences, and two months will see the situation definitely under control."

The above is cited, not from a desire to demonstrate the error of those who anticipated a short war, but simply to bring out in striking relief the discrepancy between expectations and reality as to the duration of the conflict. And what is the explanation?

Preventing the effort to separate the Entente armies at the opening of the war, sea power has enabled the Allies to increase their forces steadily, and to put in the field armies still untrained or in process of creation. To sea power also is due the fact that what Germany regarded as "the centrifugal tendencies of the heterogeneous British Empire" have been transmuted into fra-

ternal co-operation on the battlefields of Europe; and that to-day four-fifths of the world are at war with the German Empire; and finally we owe it also to the same cause that defeated armies have been saved and placed again in the field, that grave errors have been remedied, and that to-day, in spite of the tremendous upheaval in Russia, we are keeping up the war as energetically as possible, with firmest faith in the victory of our armies, and with new cards of the highest value still to put in play.

All this has been accomplished in the face of enemy efforts to thwart our free use of the sea.

In the first months of the war the destruction of commerce was kept quite within foreseen limits, in spite of the desperate assaults of enemy cruisers. "We had assumed," said Mr. Churchill, "a loss of 5 per cent of our merchant marine in the first two or three months; instead I am glad to be able to state that the losses have reached only 1.9 per cent."

When her ships designed for commerce warfare were destroyed, Germany had recourse to submarines.

In harmony with this method of attack on British commerce was the vigorous offensive toward Calais undertaken by the right wing of the German army (Oct. 17–Nov. 9, 1914), the failure of which, incidentally, was greatly assisted by British monitors hindering the movement of enemy troops along the coast and supporting the left flank of the Belgian army. Thwarted in its effort to control the southern side of the Channel, Germany made effective use of her strip of Belgian coast by establishing naval bases at Bruges and Seebrugge, the importance of which is fully recognized.

The land and sea strategy of the enemy are thus seen to have been in close correlation, such as can scarcely be said to have existed on the side of the Allies. For instance, it would have been a good example of the decisive influence of sea power on the course of the war if the Allies had found it possible, before the conquest of Serbia, to move an army from the east coast of the Adriatic to block the way to Turkey. But at that time the Allies were still far from the concept of a united front, of one war whether by sea or land, and of utilizing sea communications to checkmate the advantage of central position. The example cited is purely hypothetical, presenting obstacles which prevented its

adoption; but it may serve to fix the idea of the importance of naval supremacy as a means of carrying the attack into favorable fields; nor is it logical to depreciate this importance on the basis of the failure at the Dardanelles and the inactivity at Saloniki.

The fact remains that, in spite of the work of the submarines, an immense number of troops have been, and undoubtedly will be, transported by sea with minimum losses. Convoys with units of fair speed and adequate escort have comparatively little to fear. The heavy losses have been among the cargo carriers, making the problem here more difficult.

It is true there are reassuring signs. The losses are diminishing, in spite of the increased number of ships engaged in European traffic owing to the American alliance. The severe losses at the opening of the unrestricted campaign are not likely to be repeated, since they corresponded to a different control of traffic from that now in force, and to the combined action of all enemy submarines, the units of which must now take turns in port for supplies and refitting. The counter-measures of various kinds now employed indicate that the day is still far distant when the submarine may be said to have rendered powerless the Allied armies. The final adoption of the logical system of convoys has enabled the navies to increase their direct protection. And this will be still further increased with the application, even fuller than hitherto, of the principle of a united front and absolute community of interests.

Nevertheless, I repeat it would be absurd to deny the serious menace of the submarine; and the question may be logically asked whether, viewing the whole situation, this system of warfare has produced the results expected by the Central Empires.

In undertaking the submarine campaign, and pushing it to its extreme limit, the Central Powers virtually declared war on neutrals. While thus likely to increase the number of enemies, the measure would still be useful from a military standpoint if it operated to hasten the defeat of the Allied armies, so as to prevent the intervention of new belligerents on the battlefields of Europe. It was thus a question of time; and on the strength of the present situation it is possible to affirm that the German calculations failed.

The Entente has suffered severely from the submarine; but the offensive preparations on the western and Italian fronts have

nevertheless developed with increasing vigor, and as for the Russian front, it is impossible to attribute anarchy to submarines.

"It was planned last year," Lloyd George recently stated, "to carry out a grand concerted attack. Russia was ready as never before; the jaws began to close, but, to speak frankly, one of the parties found itself for the moment handicapped, and as a result it was impossible to secure the convergent pressure hoped for. Whatever our difficulties, we find ourselves strong and steadfast at the end of three years of war. We may say with all assurance that we would not exchange our military situation to-day for the enemy's. Let us look at the facts. What could Germany accomplish in a year in which one of her enemies, deemed the most dangerous at the outbreak of war, was virtually paralyzed by internal difficulties? We should at least expect her to defeat all assaults on other fronts. On the contrary, she has been beaten in every important battle—and these indications are not misleading."

As regards the effect of the submarine campaign on land warfare, there are evidently but two possible hypotheses. One is that the submarine has exerted no appreciable influence on the military situation. In other words, that if there had been no such campaign, the situation on the land fronts would still be practically what it is to-day. The other hypothesis is that, but for the submarine, Germany would now be conquered.

In view of the assured participation of American forces on the western front, it follows that, if on the basis of the first hypothesis the submarine has not improved the military situation, then the count is heavily against it, since it has been the cause of a powerful reinforcement to the Allies. On the basis of the second hypothesis the submarine campaign appears at best a cruel remedy, which has served to prolong the conflict, postponing an outcome the character of which was indicated when the Germans were halted on the western front.

The intensive "attrition" warfare carried on against Allied commerce has been accompanied by a similar campaign against the Allied navies, a campaign which in the North Sea has been prosecuted by every means at the enemy's disposal, including fleet actions, whereas in the Adriatic the Austrians have consistently avoided risking their main units.

Notwithstanding the losses incurred, the situation after three years of war still proves the overwhelming superiority of the Allied fleets, without regard to naval reinforcements from the United States.

Submarines, mines and aircraft have excluded the possibility (a moot point before the war) of a blockade maintained normally by a strong cruising force in enemy waters; instead, as was foreseen, the blockade is maintained *by a fleet in force at its bases.*

The Allied fleets are nevertheless blockading fleets in the true and proper sense of the word, since they are the means of completely cutting off the sea communications of the enemy, and preventing their fleets from undertaking a serious offensive or issuing from their bases without incurring battle against superior force.

This holds without disregard for the fact that, as a result of geographical conditions, the narrow seas where the Allies enforce the blockade are at a considerable distance from the enemy bases.

The situation of a blockading fleet, however superior, is obviously difficult, since it must be held in contant readiness to check an initiative undertaken by the enemy at his own selected time; hence arises the possibility that the enemy may occasionally gain a success in secondary actions, carrying out his policy of attrition. This advantage is increased in the present instance by the peculiar character of the enemy coasts, already noted, which prevents the blockading fleet from forcing an engagement.

In this situation, until the enemy fleet decides that the opportune moment has arrived to issue forth and take the chance of battle and possible destruction, the mission of the blockading fleet consists in maintaining the equilibrium. And whatever the inherent advantages in the supremacy thus secured over all the seas (except the Baltic and Black), this mission is still a thankless one, for it seems synonymous with an inertia and uselessness not ordinarily regarded as in keeping with the character of naval warfare.

In the land war, every battle has tangible results in the way of territory gained, maintained, or lost; in the naval war, on the other hand, if one fleet merely paralyzes another, forcing it to remain shut up in port for safety, or if in a battle in which losses are balanced, it gains a strategic victory (forcing the enemy to

resume a passive attitude), or even if, finally, it succeeds in inflicting a full defeat, it still seems to have made but snail's progress toward a victorious peace. Scattered over the surface of the ocean, the wreckage of battle seems to question why all these men have died; and a tragic day's work is seemingly in vain.

But let those who are thus misled simply ask themselves what would have happened had our preponderance of strength been swept away and the enemy secured freedom of action on the seas.

Those who are very rightly preoccupied to-day with the menace of the submarine, may well reflect upon what would happen if naval preponderance should pass into the hands of the enemy. In that case, we should at least have a quick proof of what the Germans might have done at the opening of the war—our sea trade would cease to exist. And how would our armies fare then? Have we sufficient iron, coal, munitions of war?

It may therefore be taken as mathematically certain that the fleet, while, owing to the enemy, its work is *silent* and *obscure*, constitutes a vital factor on a par with our armies. Nor will it be denied in the future, considering the difficulties (perfectly manageable and tolerable) that we now endure, that *this war has shown in how great a measure we depend on the sea.*

This granted, especially by those who nourish certain illusions of easy accommodation with the enemy and a return to the *status quo ante*, let us look into the fundamental principles that have led our adversaries to bring on the tremendous conflict, principles that are reflected clearly in their views on naval warfare.

Bernhardi, in the work previously cited, already foreseeing Italy's participation with the Allies, wrote as follows:

"We shall, therefore, some day, perhaps, be faced with the possibility of standing isolated in a great war of the nations . . . . and shall have to trust solely to our own strength and our own determination to conquer. This steadfast determination to win complete victory will make the next war *one of unprecedented violence.* A war fought and lost under such conditions would destroy our laboriously gained political importance, would jeopardize the future of our nation, would throw us backward for centuries, would shake the influence of German thought in the civilized world and thus check the general progress of mankind in its healthy development, for which a flourishing Germany is

the essential condition. Our next war will thus be fought for the highest interests of our country and of mankind. This will be its importance in history. *World power or downfall* will be our rallying cry. We must have the steadfast will to conquer, the iron resolution *to struggle to the end, even in the event of a lost war.*"

The facts demonstrate that the conduct of our enemy in the war has been in complete accord with these principles.

Admiral von Tirpitz, in an interview in December, 1914, in which he first threatened the employment of the submarine against commerce, complained at the feebleness of American protests against England's closure of the North Sea, and put the question: "What objection could the United States make if Germany should declare submarine warfare against the entire enemy merchant marine?" When Tirpitz spoke thus, the threat was already in process of execution, for the sinking of merchantmen by submarines had begun during the preceding October; and on February 4 (1915) following, Admiral von Pohl, head of the German Admiralty, proclaimed as a "danger zone" all the waters around the British Isles, including the Channel, upon entering which both enemy and neutral vessels would be subject to destruction without assurance for the safety of passengers or crew.

The events that followed are familiar to all. The United States despatched note upon note, but for a long time it looked as if her protests would be confined to the diplomatic field. Meanwhile, the land war failed to give Germany the results hoped for, the decisive action attempted at Verdun failed, and so the submarine campaign was pushed to the uttermost limit, without regard to the nationality of vessels attacked, the enemy thus elevating a secondary into a principal weapon, and attributing to it an importance not less than that of her armies in the field.

Thus Germany no longer considered what the United States would do; *she burned her bridges behind her,* giving to her naval, as to her land warfare a character of unprecedented violence, seeking to strike terror by showing herself ready to make war on all the world, employing every means to secure world power, wishing no compromise between that and downfall.

In striking contrast, indeed, are the indefinite peace proposals Germany has repeatedly given forth. To dispel the delusion that

people with purposes so fixed will easily renounce their aims, it is sufficient to record the words of Bernhardi: "Aspirations for peace contain an element of weakness, dissention, and indecision; their apparent humanitarian idealism constitutes their danger; they are in reality *an unhealthy utopia, or a cloak to cover intrigue.*"

Only upon a profound realization of the set purpose of our adversaries, and recognition of the fact that every show to the contrary is a device to break down our morale, are we in a position to ask what use the enemy intends to make of his main fleet.

In the North Sea, neither the prevalent foggy weather nor the multitude of units in the opposing force excludes the possibility that the Germans can secure opportunities to impose action in superior force.

Such was axiomatically the strategic principle guiding the general sortie of the German fleet before Jutland, aside from particular circumstances, as yet unknown, which may have led the Germans to leave their bases.

In the battle following, both belligerents suffered severely; but while it is needless to enter into a discussion of the tactical results, it will be agreed that the battle demonstrated the full capacity of the British fleet to execute its mission as a blockading force. After the battle the strategic situation remained unchanged—that is, the maritime supremacy of Britain was confirmed.

But it will be useful to note the proof thus afforded of the resolute purpose of Germany to pit her main fleet against her chief opponent. And in view of the fact that the guiding principle of German war policy throughout has been to utilize *all* forces to the extreme limit (even in case of a lost war), it seems by no means hazardous to affirm that the day will come in the course of the war when Germany will be led to undertake a desperate effort on the sea. Before resigning herself to decadence, she will play *all* her cards; she holds back, however, for while she is a player of extraordinary boldness, she knows that the cards corresponding to the navy are precisely the ones that must be played at the right time.

Reflection upon the importance of the naval side of the war and upon the full guaranties of success afforded by the naval predominance of the Allies, is essential to a clear vision of the certainty of our victory.

III. CHANGES IN NAVAL WARFARE

Only after bringing out by the preceding discussion the vital function of the main fleets, are we in a position to give a logical answer to the question put as the main theme of the present essay—as distinguished from delusions based on appearances, what are the substantial differences between the war as it is and the war as it was foreseen? Granted that, along with new weapons (submarine and aerial) the war has confirmed the present usefulness of old types, what changes for the immediate future are counseled by experience? May certain categories be at once eliminated?

As a result of the previous development of submarines and aircraft, it was realized before the war that great precautions would be necessary in carrying out a military blockade, and it was admitted not only that it would be folly to attempt a close blockade with the main fleet, as in the Spanish-American war, but that it would be impossible to keep the fleet within a cruising radius of about a hundred miles from the enemy bases, that is to say, within the distance considered safe when the defence was limited to torpedo craft. This development by no means eliminated the idea of blockade, but implied that the blockading force must possess well-located bases, though distant from the enemy, assuring a close patrol of enemy waters, and a sufficient number of units of varying sizes to maintain contact with a force trying to break through.

It was known that the British Navy, in harmony with this concept, and confronted by the threatening growth of the German fleet, had opportunely established bases in the north of Scotland and the near-by islands; and in consequence it was easy to presume that, to avoid division of strength, the approaches to the Straits of Dover would be closed chiefly by mines.

From the time of the Russo-Japanese War, the extensive use of mines was foreseen, especially in the North Sea, where strategic and hydrographic conditions are favorable.

Under these circumstances, there was nothing unexpected in the British Admiralty notification of October 3, 1914, announcing that, in view of German mine-laying and submarine activities, the government had authorized the mining of certain parts of the North Sea, and in particular an area of 4000 sq. km. between Ostend and the English coast.

It was very naturally foreseen that the countries whose communications were thus intercepted would exert every effort to keep up their trade by means of neutrals, and it was known in fact that Germany had in time of peace perfected an organization to that end. Yet in the beginning of the war England suffered this ostensibly neutral traffic beyond all tolerable limits, as shown by the rapid and enormous increase of imports to Scandinavia and Holland.

By those who took account of the necessities of modern warfare, it was recognized that, however inferior the enemy navy, it would be impossible to conform strictly to past standards as regards continuity and effectiveness of blockade in territorial waters, that the blockade would cover stretches of coast rather than specified ports, and that contraband would be given a wider application.

November 2, 1914, that is, a month after the mine-field notice, England proclaimed all of the North Sea a *military area*, the effect being that ships of all nationalities would incur danger in crossing a line from the Hebrides through the Faroe Islands to Iceland. Thus England seriously restricted neutral commerce, which, however, could still be carried on by following prescribed routes.

We enter the realm of the unforeseen when we pass from the action of England to that of Germany, as a result of the employment of the submarine as a commerce destroyer operating for long periods and remote from its bases.

This new system of commerce destruction, as now applied by Germany, signifies complete disregard of the consequent attitude of neutrals—that is to say, quite aside from humanitarian considerations involved, such a course of action could be conceived *only* by a belligerent who would permit no interests whatever to interfere with a possible means of injuring the enemy. Such is the course Germany has seen fit to pursue; but in a general forecast of future international provisions in this matter, it would be absurd to assume submarine warfare in its present unrestricted form as the normal recourse of the weaker belligerent on the sea. The attitude of neutrals cannot be regarded as negligible; and it follows that submarine warfare will be *tolerated only to the point where neutral states feel constrained to resist.*

With the idea of determining the extent to which the submarine as a commerce destroyer has altered naval warfare, let us assume the utmost passivity on the part of neutrals.

Let us consider in succession the two methods of employment: unlimited *"cruiser warfare,"* and *blockade of limited areas.*

It would be illogical to deny to the submarine, as to other naval vessels, the right of visit and search, the resultant situation being inevitably as follows:

Normally, the only measure the submarine can employ against enemy merchant vessels is to sink them; hence, necessarily, the merchant vessel has the right to arm for defence, to combat the enemy by any means, and to practice every stratagem to avoid destruction.

Evidently, under these conditions, the exercise of visit and search is out of the question. This was verified, in fact, by the astute German Admiralty in its notice to the United States at the opening of the unrestricted campaign: "Great Britain has armed her merchant vessels for defence against submarines, and the United States has accepted the British point of view. But under these conditions it is impossible for a submarine to approach a merchant vessel to examine her papers, since in so doing, in case the vessel is of enemy nationality, the submarine is exposed to attack by gunfire and bombs. Moreover, the enemy has advised her merchant vessels to fly neutral colors, paint out names, alter funnels, and seek by other ruses to avoid the consequences of nationality."

Neutrals being thus deprived of the guaranties inherent in visit and search, and neutral naval convoy for merchantmen being impracticable, it follows necessarily that *unlimited "cruiser warfare" cannot be carried on in a manner acceptable to neutral states.*

It will therefore be seen that submarine operations against commerce must be confined to blockade in the ordinary and proper sense of the word. And moreover, in view of the requirements of continuity and effectiveness (which cannot be fulfilled in case of submarine blockade), it is clear that, unless neutral rights are to be enormously sacrificed, the blockaded area must be not only clearly defined, but reasonably restricted. Otherwise we should fall back again into unrestricted cruiser warfare, as now actually practiced; for in immense areas such as those set off by Germany, including at first the waters around the British Isles and later large parts of the Atlantic and Mediterranean, a blockade can exist only in name.

Let us suppose that neutrals, on the basis of their assumed passivity, should make no objection to a blockade extending beyond territorial waters and applying not merely to a specified extent of coast but to the entire enemy coast-line. Let us assume the blockade zone to extend outward from the coast 20 or 30 miles; and within this zone, let us assume submarine and submarine mine-layer activities in every form.

Obviously neutrals would not consent that such a blockade should cut off straits which are necessary highways for trade between neutrals. But limiting the activities of the submarine in this manner, what may be said as to its effectiveness?

On the basis of present experience, it will be readily granted that, within these limits, in sectors having important ports as their centers, it would be possible to maintain safety routes by airplane and patrol activity of various kinds so intensified as *to make successful enemy attacks absolutely exceptional.* In fact, on the basis of this hypothesis, which assures safety to ships outside the zone, a far greater number of units would be available for the task of clearing safety routes within the zone itself.

Hence it seems logical to conclude that *submarine commerce warfare loses its capacity to exert a serious effect on warfare whenever it is carried on in a manner tolerable to neutrals.* In other words, it is simply a question whether the unrestricted warfare now carried on by Germany does or does not come under that classification.

To avoid falling into the absurdity of considering complete disregard of the attitude of neutrals as the general norm for the future, we are forced to recognize that *the method of attack on commerce which to-day constitutes the chief change in naval warfare cannot be considered as having a substantially permanent character.*

We are led to this conclusion absolutely without taking into account the anti-submarine measures that may eventually be developed. And now if we should assume submarine commerce warfare abolished, or at least reduced to an element of secondary importance, wherein lies the astounding divergence between forecasts and reality in the naval war?

In respect to changes in doctrine as to the employment of sea power, that is to say, the proper objectives of battle fleets, we encounter simply an evolution rather than a revolution of ideas,

whether in the field of strategy or tactics. The increased dangers arising from the development of more recent means of warfare have tended to limit operations to such as have a very definite character, and are of sufficient importance and sufficient prospect of success to warrant the risks taken and the extent of the force employed. This means simply that modern conditions have imposed a stricter regard than in the past for sound principles of warfare. It is of chief interest to note that large fleets of belligerents have put to sea when it was deemed necessary, have come in contact, and have engaged in heavy combat in a manner foreseen before the present development of submarines.

One of the most important teachings of the present war is the practical demonstration of the disputed principle that, for ships of the line as for other types, high speed is a factor of the greatest importance, whether from a strategical or a tactical standpoint; in this respect, ***reality has abundantly confirmed the most favorable predictions.***

There was nothing unexpected in the manner in which at Jutland contact between the two forces was first established by light and battle cruisers, nor in the manner in which this led up to the engagement between the main fleets. Moreover, the decisive importance of long-range combat, as brought out by the war, has completely confirmed those principles that for the last 20 years have guided the evolution of tactics, types of ships, and methods of fire, on the basis of the axiomatic necessity of *hitting at the earliest moment* (*i. e.*, at long range) *and hard.* War experience has likewise confirmed the foreseen importance of day attacks by destroyers during contact between main forces, as well as similar attacks on the night after battle. These, among other confirmations of theory, are cited not with the idea of extended examination, but merely to emphasize the absurdity of declaring the downfall of naval principles as set forth before the war.

While particular considerations of a more technical character would be inopportune at the present time, the observation may be made that of the two chief types of armored ship—the battle cruiser and the dreadnought—it is the former whose future place must be considered more secure. Experience has demonstrated that this type of ship, aside from its essential function when incorporated with the fleet, is well adapted to supply most expeditiously and completely the protection required for remote maritime in-

terests, as illustrated by what happened at the Falklands. Its value has been brought out also under conditions prevailing in more restricted waters, whether for compelling the enemy to fight under adverse circumstances, or for getting within range before the enemy can withdraw to his base.

In long-range actions, owing to the sharper angle of fall of projectiles, ships are relatively more vulnerable on account of insufficient horizontal protection; hence some change is called for in the disposition of armor.

The increased risks encountered by ships render it desirable to apply so far as possible the principle (old rather than new) of dividing the strength of the line into numerous units, without lowering the total strength. This principle, however, should be applied with due regard to effective fire control, which does not permit reducing the number of heavy guns per ship beyond a certain limit, and with regard also to the extension of the line involved in the multiplication of units when in column at high speed.

Reasoning thus in summary fashion, the statement may be ventured that the ideal type of armored ship, under conditions to-day, should have about 30 knots' speed, 8 guns of large caliber, and armor protection considerably modified from present practice.

This by no means implies the abandonment of present types—simply their evolution, consisting in the fusion of the line battleship and the battle cruiser. (Note: This does not exclude the possible advantage of a new type of battle cruiser, supplementing the type just suggested, with greater speed and fewer big guns.) Further than this, it cannot be said absolutely that the experience of the war counsels the elimination of any category of ships now constituting the fleet.

We come back thus to the fanciful hypothesis that the abolishment of first-line battleships, in spite of technical counsels, will be accomplished by future international agreement. This, as already said, is based on the supposed equilibrium now existing between the opposing fleets. But, as we have shown, this equilibrium is far from existing in reality; for even if the present war had not presented and should not present a combat between the main forces, the fact would nevertheless remain that naval superiority has conferred upon one of the belligerents a freedom

of maritime communications which, however contested by submarines, remains an essential decisive factor in the war.

One should also bear in mind that any war, whatever its magnitude, represents a particular case; and in drawing lessons, one should not only seek a right interpretation of what actually happened, but should also consider how it may happen differently in future. Thus, even assuming (though by no means admitting) an equilibrium in this war, that certainly is not the only possible outcome of the co-existence of two opposing fleets. As a matter of fact, for a country not invulnerable to a naval offensive to the same extent as the Central Powers, and inferior to its enemy in naval strength, the assumed equilibrium would be absolutely non-existent.

In consideration of the disparity arising from unequal naval development and different possibilities of maritime defence among nations, and recognizing that against an enemy fleet defence by minor means (mines, aircraft, submarines, torpedo craft and scouts) is insufficient, we may conclude that the idea of abolishing battleships should be relegated to the realm of a perilous utopia.

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THE REQUIREMENTS FOR ADMISSION TO THE NAVAL ACADEMY—AN HISTORICAL REVIEW

By C. H. FOSTER, Instructor, U. S. Naval Academy

It is the purpose of this article to review the various changes that have taken place in the examining and selecting of candidates for the Naval Academy, and to present certain facts of interest to all friends of the navy. Aside from contributing slightly to the history of naval education, the writer hopes to assist in proving the reasonableness of the Academy's standards and the feasibility of raising the average of those who are later to become the officers and commanders of our fighting ships. The first part of the article will take up the aim and methods of the early examiners of candidates, the examination subjects in comparison with contemporary college requirements, and the various changes that have occurred, with their bearing on present conditions. The second part will show the uniform tendency of the changes in methods of selecting candidates and the possibility of improving, through better selection, the material out of which naval officers are to be made.

In 1845 the seven successful candidates were "found respectable in intellect and attainment," after being examined in accordance with Commander Buchanan's "Plan of the Naval School at Fort Severn," of August, 1845. In this he had proposed the following requirements for the admission of candidates:

Every applicant for admission to the school must be of good moral character, not less than thirteen nor more than sixteen years of age,[1] and

[1] The age of admission for candidates has varied from thirteen to twenty-two years. From October, 1845, to October, 1851, the minimum was thirteen and the maximum sixteen. From 1852 to 1855, it was fourteen to sixteen; from 1855 to 1861, fourteen to seventeen; from 1861 to 1863, fourteen to eighteen; from 1863 to 1865, fourteen to seventeen, except that enlisted boys were allowed to enter up to the age of eighteen years.

must be examined by the surgeon of the institution to ascertain if he be free from all deformity, deafness, nearness or other defect of sight, or disease or infirmity of any kind which would disqualify him from performing the active and arduous duties of a sea life. He must be able to read and write well, and be familiar with geography and arithmetic. The Academic Board will examine him on these branches, and certify to his capacity for admission into the school.

The last sentence indicates what the first superintendent of the Naval School thought should be the basic principle in examining candidates. Some years later the Academic Board[2] formulated its ideas on this important question as follows:

From 1865 to 1880 the ages of admission were fourteen to eighteen, but from July, 1864, to August, 1882, "cadet engineers" were permitted to enter between the ages eighteen and twenty-two. Some of the "acting third assistant engineers," however, were even admitted as old as twenty-three years and nine months. After the fifth of August, 1882, fourteen to eighteen years were the ages required for all candidates. Age, as well as other entrance requirements, then became the same for all candidates, and no difference was made between "cadet midshipmen" and "cadet engineers"; all after admission were thereafter styled "naval cadets." On March 2, 1889, the minimum age of admission was established by law as fifteen years, and the maximum as twenty. These were the limits until January, 1904, when the minimum became sixteen. The present requirements, it is needless to add, are sixteen to twenty, at the date and on the day of admission. The phrase in the regulations, "examination for admission," is not taken to mean the mental examination, but the physical examination which immediately precedes the candidate's taking the oath of office and being admitted into the Academy.

[2] A quaint and illuminating example of the Board's difficulties was the case of Gaza Harasrthy. On the eleventh of October, 1848, "The Academic Board met for the purpose of examining Gaza Harasrthy of Wisconsin (Hungarian by birth), a candidate for admission into the Naval School. The case of this young man was peculiar. He has brought a letter from the Hon. Sec^y. of the Navy expressing a strong wish for his admittance & intimating that his knowledge of the German and Hungarian languages might make amends for his ignorance in the requisite branches. He was accompanied also by his friend, the Hon. Joel B. Sutherland, who showed great anxiety in the case. The Superintendent of the Naval School had the preceding evening (10th), sent for Prof. H. H. Lockwood, (Prof. Chauvenet being absent from Annapolis) and had expressed a wish & command, to have a special & detailed report respecting this examination.

"The examiners were Prof^s. H. H. Lockwood, Girault, and Jones. The candidate was found to be deficient in all the branches specified in our orders for such occasions. The Board decided not to consider the orders from the Supt. Nav. School as official, in as much as they were not made in an official form. They therefore directed their chairman

The object of this examination (for admission) is twofold, *primarily* to ascertain the *capacity*, and secondarily the *attainments* of the candidate. If he gives very clear evidence of good capacity and intelligence, it becomes unnecessary to insist upon an exact conformity to the *letter* of the regulations of the Department, requiring him to be *familiar* with Arithmetic and Geography.[2]

With a view to testing the capacity of candidates—their intellectual power rather than their attainments—they were required from 1845 to 1884 to "pass a satisfactory examination before the Academic Board." The examination was almost entirely oral, with little more than enough written work, such as writing from dictation, to test the candidates' penmanship. The personal impression counted heavily. In very much the same way, candidates for the Royal Naval College at Osborne, England, at the present time are examined before the Interview Committee appointed by the First Lord of the Admiralty. In 1875 the Register announced that "all examinations, except in reading, will be written." Although oral examinations, or personal interviews, may have ceased in 1875—so far as can be determined from the journal of the Academic Board—it was not until the fall of 1883 that the Regulations were changed. From 1884 to 1902, inclusive, candidates were examined at the Academy "by the Academic Board," in the phrase of the Registers. The first examination conducted by the Civil Service Commission, as stated by the Secretary of the Academy, was on August 13, 1901. From April 21, 1903, the regular examinations have been conducted by the Civil Service. The last examination held in Annapolis was in June, 1911.

The subjects and other details of the entrance examination were largely decided by the Academic Board until 1862. In that year

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pro tem., Prof. H. H. Lockwood, to make out the report simply in the usual form, 'not qualified', & to say to the Supt. that if he would give an official order, we would make out a special and detailed report: but that its only effect could be to show more strikingly the great deficiencies of the candidate.

Attest—GEO. JONES Sec^{y}." *

* Printed through the kind permission of the Superintendent, Rear Admiral E. W. Eberle, from the Record of the Proceedings of the Academic Board of the Naval School, October 4, 1845, to June 20, 1854.

[2] See Record cited, p. 48.

was enacted the provision,[1] still in force, that "All candidates for admission into the academy shall be examined according to such

[1] The act of 16 July, 1862, was revolutionary. It provided commissions on graduation from the Academy. These were given on 28 May, 1863, to the 20 midshipmen graduating that year, but were withheld from succeeding classes by a ruling of the Department. Other innovations were the title of midshipman, appointments by the President at large and from enlisted men, appointments in certain circumstances by the Secretary, and the nomination of alternates. Section 11 of the act follows. "That the students at the Naval Academy shall be styled midshipmen *and* until their final graduating examination, when, if successful, they shall be commissioned ensigns, ranking according to merit. The number allowed at the Academy shall be two for every member and delegate of the House of Representatives, two for the District of Columbia, and ten at large. They shall be between the ages of fourteen and seventeen, physically sound and well formed, and of robust constitution. They shall be examined for admittance into the Academy according to the regulations which shall be issued by the Secretary of the Navy, and if rejected shall not have the privilege of another examination for admission to the same class, unless recommended by the board of examiners. The President shall select the two from the District of Columbia and the ten at large, and the President shall also be allowed three yearly appointments of midshipmen, who shall be not over eighteen years of age, who shall be selected from boys enlisted in the navy, and who have been at least one year in the service, six months of which shall have been sea service. From and after the fifth of March, eighteen hundred and sixty-three, the nomination of candidates for admission into the Naval Academy shall be made between the fifth of March and the first of July of each year upon the recommendation of the member or delegate, from actual residents of his district, and they shall be examined for admission in July: *Provided*, That when any candidate who has been so nominated shall upon examination be found physically or mentally disqualified for admission the member or delegate from whose district he was so nominated shall be notified to recommend another candidate who shall be examined in September following. And it shall be the duty of the Secretary of the Navy, as soon after the fifth of March as possible, to notify, in writing, each member and delegate of any vacancy that may exist in his district; and if said member or delegate neglects to recommend a candidate by the first of July in that year, then it shall be the duty of the Secretary of the Navy to fill the vacancy. Midshipmen deficient at any examination shall not be continued at the academy, or in the service, unless upon recommendation of the academic board; nor shall any officer of the navy who has been dismissed by sentence of a court-martial, or suffered to resign to escape one, ever again become an officer of the navy: *Provided, however*, That no greater number of midshipmen shall be appointed by the President at large under this or any other law of Congress than shall be allowed by the provisions of this section."

regulations and at such stated times as the Secretary of the Navy may prescribe."

The first subjects that candidates were examined in were reading, writing, geography, and arithmetic, as outlined in the plan of the first superintendent.[8] The standard required was indicated in the Register of 1860, as follows: Candidates for admission "must be of good moral character, able to read and write well,—writing from dictation and spelling with correctness,—and to perform with accuracy the various operations of the primary rules of Arithmetic; viz., numeration, and the addition, subtraction, multiplication, and division of whole numbers." English grammar was added in 1862, according to the following notice: Candidates "will be examined as to the parts of speech and the elementary construction of sentences, and will be required to write an original paragraph of a few sentences."

The early requirements of the Naval Academy were apparently designed to equal, as far as was practicable, the requirements of colleges during the forties and fifties. An examination of the entrance requirements of Harvard and Yale, for instance, makes it clear why such seemingly elementary subjects as arithmetic and geography were included in the Academy's requirements. In 1845 Harvard's requirements were as follows:

For admission to the Freshman Class the candidates are examined in the following books, viz.:—

By the Latin Department in the whole of Virgil and of Cæsar, in Cicero's Select Orations, Andrews' and Stoddard's Latin Grammar, including Prosody, and in writing Latin.

By the Greek Department in Felton's Greek Grammar, Sophocles's Greek Grammar, including Prosody, and in writing Greek (with the accents).

By the Mathematical Department in Davies's and Hill's Arithmetic; Euler's Algebra, or Davies's First Lessons in Algebra to "The Extraction of the Square Root"; and "An Introduction to Geometry and the Science of Form, prepared from the most approved Prussian Text-Books," to "VII of Proportions." Also in Worcester's Ancient and Modern Geography.

The college entrance requirements of this period are indicated in the following terms of admission to Yale College for the year 1845:

Candidates for admission to the Freshman Class, are examined in Cicero's Select Orations, the whole of Virgil, Sallust, Jacobs', Colton's or

[8] J. R. Soley—History of the Naval Academy (1876), p. 57.

Felton's Greek Reader, the first three books of Xenophon's Anabasis, Andrews' and Stoddard's Latin Grammar, Goodrich's or Sophocles' Greek Grammar, Andrews' Latin Exercises, Latin Prosody, Arithmetic, English Grammar, and Geography.

The deficiency of most candidates for admission, in the Latin and Greek Grammars, Latin Prosody and Composition, Geography, and the theoretical part of Arithmetic, makes it necessary to remark, that the examination in these subjects will be strict and comprehensive. Candidates will also observe, that Arithmetic is no longer studied in College, and an examination for admission is therefore held in both the theory and practice of Arithmetic.

No one can be admitted to the Freshman Class, till he has completed his fourteenth year, nor to an advanced standing[*] without a proportional increase of age.

A very interesting innovation was made at the Naval Academy in 1866, when competitive entrance examinations were first held for "cadet engineers," or, as they were first called, "acting third assistant engineers." The following were the subjects: Arithmetic, algebra, geometry, rudimentary natural philosophy, elements of inorganic chemistry, English grammar and English composition, United States history, pencil sketching and right-line drawing, and the operation and uses of engines and tools. In 1870 free-hand drawing was substituted for pencil sketching. Chemistry, history, and drawing were omitted in 1871; geography was not required of cadet engineers until 1874.

In 1882 the distinctions between cadet midshipmen and cadet engineers were abolished, so that all aspirants had to meet the same

[*] Before 1871 the Regulations for the admission of candidates contained a provision of considerable interest; namely, that "A midshipman may be advanced to any class which he may be found qualified to join, either upon his admission or at any subsequent examination; and he may be graduated at any June examination at which he shall be found fully qualified to pass a graduating academic examination." Under this provision, two cadet engineers entered the Academy in 1867, and graduated in 1868 with the class of acting third assistant engineers that had entered in 1866. The late Admiral Mahan entered the Academy as a third classman on 29 September, 1856, graduating in June, 1859, second in his class. At the semi-annual examination, also, in February, 1852, ten members of the class that entered in 1851 were selected for advancement. Six of them, including Thomas O. Selfridge and Joseph N. Miller, graduated in 1854. Oddly enough, the first midshipmen to finish the continuous four-year Academic course, which had been instituted in October, 1851, really finished in three years. No provision for advanced standing was announced after 1870.

requirements. These comprised United States history and algebra, after 1882, as well as the original subjects, writing, reading, spelling, arithmetic, and geography. In 1889 world's history and plane geometry were added, and in 1902 punctuation. In 1905 reading, and in 1913 world's history, were omitted. During 1913-1914, it might be added, "general history" was taught at the Naval Academy. It was dropped from the curriculum after a poll of the third and fourth classes had revealed the fact that general or world's history was almost universally taught in the secondary schools of the country.

In all of these changes in entrance requirements, the Naval Academy has been held back by the standards of the public schools of the nation. It has followed, though tardily, the practice of the colleges. Algebra, for instance, was first required of all Academy candidates in 1883; but the colleges had required it for 20 or 30 years. Yale, for example, required algebra to quadratics of all candidates as early as 1846. We should note the fact, likewise, that for many years our colleges have not required arithmetic or geography for entrance, but have for many years required fairly wide reading in literature, a good knowledge of general history, a knowledge of civics and the Constitution, and a fair command of at least one foreign language besides Latin. Our secondary schools, moreover, with few exceptions, offer courses in conformity with these requirements.

The subjects now required by the Naval Academy, according to the regulations of the Secretary of the Navy, are spelling, grammar, geography, United States history, arithmetic, algebra, and geometry. For none of these does the candidate need special coaching, unless his secondary training has been weak in the fundamentals of English and mathematics. Certain changes, however, are now being formulated by a special board appointed by the superintendent with a view to bringing the Academy's entrance requirements more into the educational currents of the country.

So much for the examining of candidates. The ideal, from the first, has been to test the candidate's intelligence or "capacity" rather than his acquisition of facts, his ability to "make good" in the Academy rather than his "cramming." Requirements have been increased as fast as the standards of the secondary schools have been raised so as to include subjects, like reading

and writing, that must be mastered by every naval officer, and still ought not to burden the Academy's curriculum. In a period when colleges were receiving boys of fifteen who knew a little Greek, Latin, arithmetic, grammar, and geography, the Naval Academy accepted boys of thirteen who knew the three R's, reading, 'riting, and 'rithmetic; who were "able to read and write well, and to perform with accuracy the addition, subtraction, multiplication, and division of whole numbers." Both colleges and Academy have increased their requirements; but the Academy has not been allowed to keep pace with the colleges.

Many criticisms[1] of the Academy and its entrance requirements have not been well founded. There are some facts in connection with the entrance examinations that ought to be understood before judgment is passed. The practice has become rather frequent in recent years of allowing all applicants from some districts, without any preliminary test, to take the Academy's entrance examinations in competition with each other for the appointment. Some-

[1] Most of the reports are inaccurate, that the entrance examinations are too difficult and that only a small fraction succeed in passing. The results of candidates' examinations for the last five years have been as follows:

	Examined	Rejected	Accepted	Percentage Accepted
1913, February	135	64	71	52.59
April	591	381	210	35.53
June	303	228	75	24.75
1914, February	127	59	68	53.54
April	543	286	257	47.15
Enlisted	115	110	5	4.34
1915, February	200	105	95	47.5
April	520	320	200	38.46
Enlisted	55	44	11	20
1916, February	227	128	99	43.61
April	1216	763	453	37.25
Enlisted	66	43	23	34.84
July	350	255	95	27.14
1917, February	274	111	101	36.86
April	727	331	293	40.64
Enlisted	18	14	4	22.22
June	1417	1039	376	26.55
Total in five years	7134	4311	2823	39.57*

* For help in obtaining this and other information the writer gratefully acknowledges his indebtedness to Mr. P. H. Magruder, Secretary of the Naval Academy.

times only one out of a dozen succeeds in passing, with a perceptible lowering of the general percentage of successful candidates. In June, 1917, for instance, out of 120 candidates nominated thus for examination, only 17.5 per cent passed. Out of the total of 1417 candidates in that examination, 26.55 per cent passed.[8]

Another pertinent fact is that many candidates, as noted many times by the Academic Board, are utterly unprepared, and should in some way be saved the time sacrificed[9] in their attempting the entrance examinations of the Academy. In April, 1917, for example, 12.8 per cent of the candidates presenting themselves for mental examination failed in all six subjects.

Obviously, therefore, while changes may be made in the examinations, improvements are also highly desirable in methods of selecting the candidates themselves.

Taking up now the selecting of candidates, we find that great changes have taken place. But nearly every change has been intended by the law makers of the country to widen for the common American boy the door to the commissioned grades in the navy.

From March of 1794 to August of 1842, candidates were appointed midshipmen[10] by the President straight from civil life, with no legislative restrictions as to age, education, or fitness. There was not even a limit, after 1809, upon the number the President might appoint.[11] Abuses inevitably developed. After the custom of the British Navy, midshipmen were appointed on the

[8] Ascertained by a personal examination of the candidates' records.

[9] The Academy and Navy Department publish complete and extensive pamphlets on the entrance requirements, most of which are entirely ignored by candidates.

[10] The first seven candidates to enter the Naval School were styled, after admission, "acting midshipmen," and that appellation was kept until July, 1862. From then until July, 1870, the students admitted to the Academy were called "midshipmen." After this date and up to August, 1882, they were styled "cadet midshipmen." There were also authorized at the Academy, from 1864 until 1882, special students of engineering. The first of these entered in 1866, two as "cadet engineers," the rest as "acting third assistant engineers." The latter designation was dropped in 1868. After 1882 "naval cadet" was employed for all candidates admitted into the Academy, and was retained until July, 1902, when the good old grade of "midshipman" was restored.

[11] Park Benjamin—United States Naval Academy (1900), p. 29.

recommendation of captains in the navy and of political friends of the executive. Appointments came to run in grooves. Naval service, naval rank and influence, became almost a heritage of certain families and certain sections. Some political appointees, like Philip Spencer, proved to be outrageously unfit. Some districts secured an undue share of appointments. The charge was made, and not refuted, that of the 158 midshipmen appointed in 1841 no less than 70 had come from Washington, Maryland, and Virginia. As was to be expected, therefore, limitations were soon placed on the power of the executive to appoint candidates as midshipmen. In 1842 the number of midshipmen allowed by law was limited to 262. In 1845 the number of midshipmen allowed from each state and territory was made proportionate to its number of representatives, and it was decreed that the appointee should be an actual resident of the state from which he was appointed. In 1848, when the authorized number of midshipmen was increased to 464, it was required that appointments should be equally apportioned among the several congressional districts. In 1850 the law provided that no midshipman should be appointed from any district that had more than two midshipmen already in the navy.

Soley's history of the Naval Academy explains the origin of the present method of selecting candidates in the following way: "As it was impossible for the Secretary of the Navy to know much about the inhabitants of each congressional district, he naturally came to rely somewhat upon the testimony of the member representing the district in regard to the fitness of an applicant for appointment. From this it was an easy step to the present system, legalized by the act of August 31, 1852, by which no one can be appointed a midshipman except on the recommendation of the member of Congress representing the district in which the applicant resides. The system had already been adopted in making appointments of cadets at West Point." The power of filling vacancies in the Naval Academy is now shared also by the President, the Secretary of the Navy, senators, the Governor General of the Philippine Islands, and the Governor of Porto Rico.[13]

[13] The problem of obtaining the best candidates is affected by the number to be nominated each year for appointment. The greater the number the greater the care that must be exercised to nominate only the fit and worthy. In 1794, as stated by Park Benjamin, the number of midshipmen allowed by law was 48. In 1801 there were 350. In 1809 the number was

raised to 450, and two months later the President was authorized to appoint to the grade of midshipman as many youths as he deemed necessary. In 1842, the number was limited to 262. In 1848 the limit was made 464, and in 1862 the limit was raised again.

In 1862 two midshipmen were authorized for every member and delegate in the House of Representatives, two for the District of Columbia, ten at large, and three annually from boys enlisted in the Navy of at least one year's service, six months of which must have been sea service. These appointments from the service were authorized until 1870, and are of special interest in the light of existing law providing for the admission of 100 enlisted men annually into the Academy.

Another innovation was made in 1864, when the appointment was authorized of 50 cadet engineers who were to take a special two-year course. Under this law two cadet engineers entered in 1866, but failed to graduate. Two more entered in 1867 and graduated with the class of "acting third assistant engineers," who had entered the Academy in 1866. Cadet engineers re-appeared at the Academy in 1871, when a class of 16 was admitted on the first of October. In 1874 the appointment of cadet engineers was augmented to 25 annually. They were appointed each year after competitive examination at the Academy. 177 candidates competed for these appointments in 1879, 167 in 1880, and 155 in 1881. After bringing into the service some of its keenest minds, these competitive examinations and appointments for cadet engineers were abolished in August, 1882.

Appointments at large came into existence again, after a lapse of ten years, on the fourteenth of July, 1862, when the President was authorized to appoint, for education at the Naval Academy, ten acting midshipmen who were to be chosen from the sons of officers or soldiers. In 1867 the appointments of enlisted boys were increased by law to ten annually, and the other appointments at large also increased to ten annually. In 1870 the appointment of enlisted boys was stopped. In 1878 the appointments at large allowed in the Academy were reduced to ten. In 1902 they were increased to 15, and in 1903 were made five each year, an increase of five in the total allowed. In 1913 the number was increased to ten each year, and in 1916 to 15 each year. Fifteen is the number now authorized by law to be appointed at large by the President.

Returning now to the ordinary appointments, we find in 1867 a reduction in the number allowed by law to one midshipman for each member and delegate in the House of Representatives, and one for the District of Columbia. The number at the Academy was still further reduced in March, 1873, when the term of the Academic course was made six years by law. Appointments were filled thereafter every six years instead of every four years. Quadrennial appointments were restored, however, in June, 1900. Senatorial nominations for appointment were instituted in July, 1902. The second great increase granted the Academy, similar to that during the Civil War, was in March, 1903. Two midshipmen were then authorized for each senator, representative, and delegate, and two for

the District of Columbia. This increase was for a term of ten years, but in 1913 was extended to July, 1919.

In February, 1916, the number of midshipmen allowed at the Academy was increased to three for each senator, representative, and delegate. On April 25, 1917, there was a still further increase to four for each senator, representative, and delegate. This last expansion, however, is to affect only the classes entering in 1917 and 1918.

The appointment of enlisted men to the Naval Academy, which had been authorized in 1862 and stopped in 1870, was resumed in 1914. On June 30, 1914, it was provided that "hereafter, in addition to the appointments of midshipmen to the United States Naval Academy as now prescribed by law, the Secretary of the Navy is allowed 15 appointments annually from the enlisted men of the Navy who are citizens of the United States and not more than 20 years of age on the date of entrance to the Naval Academy, and who shall have served not less than one year as enlisted men on the date of entrance; *Provided*, That such appointments shall be made in the order of merit from candidates who have in competition with each other passed the mental examination now or hereafter required by law for entrance to the Naval Academy, and who passed the physical examination required before entrance under existing law." The number 15 was augmented on August 29, 1916, to 25 annually, and on March 4, 1917, to 100 annually.

Alternate appointments or rather nominations are unique to this country. They are extremely valuable to many boys without political influence who, by means of an "alternate," secure admission to the Academy and the expectation of a commission in the navy. Before July, 1862, no alternates were authorized. After this date, one alternate was allowed to each principal, but only in case the principal failed to pass the earlier of the two candidates' examinations of that year. Alternates and candidates appointed late were examined in September until 1902. From 1902 to 1906, inclusive, five alternates were allowed for each principal, and were permitted to take all examinations with the principals. The present number of alternates allowed is three for each principal; and they may take either the February or the April examination.

In 1903 there was authorized one midshipman from Porto Rico, to be a native of the island and to be appointed by the President on the recommendation of the Governor of Porto Rico. Somewhat similarly, on the fifteenth of February, 1916, the law authorized a citizen of Cuba, Mr. Carlos Hevia y Reyes Gavilan, to be received for instruction in the Naval Academy, at his own expense. Still another special group of midshipmen was created on the August 29, 1916, when four Filipinos, one for each class, were authorized to receive instruction at the Naval Academy. They are to be designated, one for each class, by the Governor-General of the Philippine Islands.

If all the appointments allowed by existing law were filled, there would be at the Academy, during the year 1917-1918, 2094 midshipmen, appointed as follows: 384, four for each senator; 1748, four for each of the 437 representatives and delegates in Congress; 18 already in the Academy—

The only limitation of the power to nominate a candidate for examination and appointment is that he must be an actual resident of the state or district from which he is appointed. The law does not prescribe, however, any judicial or other method for proving residence. The statement of the candidate and the recommendation of the member of Congress are never questioned by the Navy Department. And yet the intent of virtually every single change in the law is clear—to make every district sure of its due representation in the Naval Academy of the United States.

It is evident that the selection of candidates for appointment as midshipmen is very largely in the hands of senators, representatives, and delegates. Here, in the selecting of candidates, is the greatest need of change and the greatest opportunity to improve the raw material for officers, or the stuff that naval commanders are made of. The need of change is shown by the large number of wholly unprepared and unfit candidates that come up for the entrance examinations each year. In June, 1917, for example, there were 1417 candidates examined and 221 of them were wholly unprepared and unfit, for they failed in all six subjects. In April, 1917, 723 candidates were examined and 93 of them failed in every subject. In 1916, out of 1859 candidates, 150 failed in all six subjects. A great many more fail each year in four or five subjects. The nomination of wholly unprepared candidates is the main reason why so many districts are not represented in the Academy, and why sometimes a third of the authorized appointments to the Academy are not filled.[13]

The opportunity for improving this condition has already been made plain by the practice of a considerable number of members of the Congress. In recent years more and more of them have come to impose some sort of competitive preliminary test upon

and 15 entering in 1917, appointed at large by the President; also appointed by the President, one from Porto Rico and two from the District of Columbia; appointed by the Secretary of the Navy from the enlisted force, 21 already in the Academy and 100 to be appointed in 1917. The Secretary is also authorized to permit four Filipinos and one Cuban to receive instruction at the Academy. If existing law is continued in force, there will be at the Academy in four years, that is, during the year 1920-1921, a possible maximum of 2600 midshipmen. According to the usual ratio of filled to authorized appointments, there will probably be in the Academy in 1921 upwards of 2000 midshipmen.

[13] On 22 September, 1917, there were only 1447 midshipmen in the Academy. There were 2294 authorized.

all applicants for appointment as midshipman, and have in this way selected candidates of demonstrated superiority and fitness for the Academy's work. Such preliminary tests are usually based on previous examination papers of the Academy, and are conducted as a rule by local superintendents of schools. The newspapers of the district are uniformly glad to advertise, without charge, such a competition for the ambitious boys of the district or state. By this means expense for applicants and trouble for the members of Congress are both kept at a minimum.

Competitive examinations have sometimes been criticized as likely to bring appointments to the bookish or even the unprincipled, rather than to those who would make the best naval officers. But the member of Congress can restrict his competitions to those of approved character, and may base his award on other factors besides the examination mark. Rhodes scholarships, for example, are awarded on the basis of moral character, scholarship, athletics, and leadership. And civilian instructors at the Naval Academy are selected on the basis of a competition that includes teaching record, personality and bearing, health, and other factors besides mere ability to write a good examination paper. The aim is to select men according to their capability rather than their attainments alone.

The effect of making nominations of midshipmen on a competitive basis, as already practiced, has been very instructive. In June, 1917, there took the Academy's entrance examinations 206 candidates who had been nominated after taking preliminary competitive tests. Of these, 42.71 per cent were accepted by the Academic Board as mentally qualified for admission to the Academy. Compare with this percentage the 26.55 per cent accepted out of the whole number examined in June. Compare, also, the 17.5 per cent of successful candidates who, without any sort of preliminary test, were nominated for competitive examination by the Academy. In 1916, to take another year, out of 419 candidates nominated after competitive examination, 39 per cent were accepted, while of 1437 candidates nominated without competitive examination only 29 per cent passed. In 1915 the percentages were 42 per cent and 36 per cent, and in 1914, 56 per cent and 46 per cent respectively. No conclusions can be drawn from the few competitives of earlier years.

A further advantage of nominating candidates after competitive examination is shown by the records of midshipmen in the Academy. In 1916, out of 128 midshipmen entering after com-

petitive examination only 3.9 per cent failed during the year. Of 475 midshipmen entering otherwise the failures during the year amounted to 16 per cent. In 1915 the percentages of those dropped during the first year after admission were, competitives 12 per cent, non-competitives 19 per cent. In 1914 the percentages were 11 per cent and 13 per cent respectively. Before 1914, the number of candidates nominated after competitive examination was too small to warrant conclusions.

So far, then, as concerns the mental examinations, this review of the requirements for admission to the Naval Academy has shown that the original aim was to test primarily the candidate's capability, his ability to " make good " in the Academy, rather than his acquisitions of facts or rules. Ever since the first, this has been the ideal of the examiners. Following the practice of colleges, the Academy has increased its requirements as fast as our grammar schools and high schools have included more of the requisite subjects in their courses. It has never, however, been as free as the colleges to raise its standards.

Yet, notwithstanding the fact that in comparison with college requirements the entrance examinations of the Naval Academy are by no means difficult, there is often a demand for still lower standards. This has resulted, partly, from changes in the laws governing appointments to the Academy. From the apportioning law of 1845 to the present, the intent of each change in the law has been to make every district and territory of the whole nation, whatever its educational advantages may be, more certain of having its due representation in the Naval Academy and among the naval officers of the United States. The tendency always has been to widen for every American boy the door of opportunity. Reflected in each change there has been an instinctive effort on the part of our lawmakers to attain one of our democratic ideals, that of opening a career for the talents of every man. But neither the intent of equal representation nor the democratic ideal of career open to talent is regarded when unprepared candidates are nominated, and when, as a consequence, vacancies are left in more than a third of our districts. Both intent and ideal, however, could be approximately attained if the method already adopted by many members of the Congress were adopted by all. If every candidate for appointment to the Naval Academy were nominated only after a qualifying, competitive test, candidates would, as we have seen, be more successful, both in meeting the requirements for admission, and in completing the academic course.

NOTICE

The last installment of the article on Arctic Duty has been omitted from this number, but may appear at a later date.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Changes in the officers of the Institute

Lieutenant Commander G. M. Ravenscroft was selected to relieve Lieutenant Commander I. C. Kidd as Secretary and Treasurer.

Dues

The annual dues ($2.50) are now payable. It is suggested that payment be made in lump sums to cover a period of two to five years; this method of payment is practiced by a number of members, both regular and associate, and has advantages for members as well as for the Institute.

In case of death or resignation, dues paid in advance, except for the current year, will be returned to estate or individual.

Address of Members

All members are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS *are to be sent, and thus insure their receipt.*

This precaution is now of particular importance as notices of changes of station are not now available for the use of the Institute's staff.

Non-receipt of Proceedings

Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 10th of each month.

Membership

Since November 17, 108 regular members and 11 associate members have joined the Institute.

Deaths:

Rear Admiral John Schouler, U. S. Navy, Retired.

Resignations: Three.

UNITED STATES NAVAL INSTITUTE
ANNAPOLIS, MD.

REPORT OF AUDIT FOR THE YEAR ENDED DECEMBER 31, 1917

BALTIMORE, MARYLAND, January 7, 1917.

TO THE OFFICERS AND MEMBERS OF THE UNITED STATES NAVAL INSTITUTE, ANNAPOLIS, MARYLAND.

Gentlemen:—We have audited the books of the *United States Naval Institute, Annapolis, Maryland,* for the year ended December 31, 1917, and submit herewith a certificate, one page of comments and the following exhibit and schedules:

Exhibit A.—Balance sheet as of December 31, 1917.

Schedule No. 1.—Statement of cash receipts and disbursements for the year ended December 31, 1917.
Schedule No. 2.—Investments.
Schedule No. 3.—Accounts receivable.
Schedule No. 4.—Certified checks.
Schedule No. 5.—Accounts payable all as of December 31, 1917.
Schedule No. 6.—Statement of income and expenses for the year ended December 31, 1917.

Respectfully,

BLACK AND COMPANY,
Certified Public Accountants,
By WILMER BLACK, C. P. A.
(*Member American Institute of Accountants.*)

UNITED STATES NAVAL INSTITUTE
ANNAPOLIS, MARYLAND

CERTIFICATE

We have audited the books of the *United States Naval Institute, Annapolis, Maryland,* for the year ended *December 31, 1917,* and

We hereby certify that the accompanying *balance sheet* and *statement* of *income* and *expenses* are correct; and, in our opinion subject to the attached comments, clearly set forth the true financial condition as of *December 31, 1917,* and result of operations for the year ended *December 31, 1917,* respectively, as disclosed by the books of account.

BLACK AND COMPANY,
Certified Public Accountants,
By WILMER BLACK, C. P. A.
(*Member American Institute of Accountants.*)

Baltimore, Maryland, January 7, 1918.

UNITED STATES NAVAL INSTITUTE
ANNAPOLIS, MARYLAND

COMMENTS ON THE AUDIT OF THE BOOKS FOR THE YEAR ENDED DECEMBER 31, 1917

By referring to Exhibit A, Schedule No. 6, of this report, you will note how we have arrived at the Cost of Publications sold. In this amount we have included all items that are an actual part of the cost.

Our examination, which was very carefully made, disclosed no discrepancies or inaccuracies; one or two clerical errors were found and adjusted. The records, books, etc., show a painstaking and careful attention to details.

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1917

ASSETS

Current Assets.		
Cash (in bank), Schedule No. 1	$13,815.57	
Investments, Schedule No. 2	64,000.00	
Accounts receivable, Schedule No. 3	22,071.62	
Inventory, December 31, 1917 (as taken by yourselves)	9,614.26	
Certified checks, Schedule No. 4	10,041.00	
Total current assets		$119,542.45
Balance	$103,351.10	
Furniture and Fixtures	466.10	
		$103,817.20

LIABILITIES

Current Liabilities.		
Accounts payable, Schedule No. 5		$16,191.35
Total current liabilities	$16,191.35	
Balance (excess of current assets over current liabilities)	103,351.10	
		$119,542.45
Reserve Fund.		
Balance, January 1, 1917	$7,563.14	
Cash receipts	300.95	
Transferred from general fund	30.00	
		7,894.09
(This fund by the constitution is composed of $3050 originally credited to it, together with all life fees, which have been, or may hereafter be received, and the principal of this fund shall be held in perpetuity to guarantee the future interest of the life members.)		
Surplus.		
Balance, January 1, 1917	$73,615.82	
Add: Net profit for the year ended December 31, 1917 (for details see Schedule No. 6)	22,307.29	
		95,923.1
		$103,817.

EXHIBIT A.—SCHEDULE No. 1

STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS FOR THE YEAR ENDED DECEMBER 31, 1917

Balance, January 1, 1917		$20,364.54
RECEIPTS		
Dues	$5,622.69	
Subscriptions	2,452.15	
Sale of books purchased	2,554.30	
Advertisements	1,204.96	
Interest on investments	3,062.79	
Postage	1,657.92	
Binding	85.08	
Life membership fee	300.95	
Sale of extra publications	74,261.27	
Sale of Proceedings	206.25	
Certified checks	1,231.00	
Overpaid	327.23	
Stationery	.37	
Expense	.88	
Advertising	12.50	
Total receipts		92,980.34
		$113,344.88
Balance, January 1, 1918		$13,815.57
DISBURSEMENTS		
Printing and binding Proceedings	$13,828.60	
Printing and binding extra publications	45,978.12	
Salaries	5,820.50	
Contributors	3,938.75	
Authors of books (royalties)	1,765.65	
Postage and telegrams	2,166.09	
Expressage, freight and hauling	1,438.60	
Board meetings	416.00	
Purchase of books for sale	2,728.83	
Office expenses—stationery, supplies, etc.	755.75	
Stationery	520.80	
Advertising	284.10	
Prize essay award	200.00	
Certified checks	11,272.00	
Honorable mention award	175.00	
Engraving prize essay, medal and case	23.20	
Overpayments	217.32	
Purchase Liberty Loan bonds	8,000.00	
Total disbursements		$99,529.31
Balance, December 31, 1917		13,815.57
		$113,344.88

Seaman's Bank for Savings, New York City.			
Balance as per letter dated January 5, 1918..			$3,000.00
Rhode Island Hospital Trust Co., Providence, R. I.....			
Balance as per letter dated January 5, 1918..			3,570.78
Society for Savings, Hartford, Conn.....			
Balance as per letter dated January 7, 1918..			3,695.50
Farmers' National Bank, Annapolis, Maryland			3,549.29
Balance as per statement dated January 3, 1918		$14,202.58	
Less Outstanding Checks.			
#2747	$ 2.50		
2982	7.50		
3171	1.80		
3439	2.04		
3498	1.50		
3550	43.00		
3656	.50		
3746	84.00		
3752	8.00		
3782	19.98		
3813	6.23		
3818	10.00		
3822	.60		
3827	112.50		
3829	4.50		
3830	2.25		
3831	4.00		
3833	119.00		
3834	56.00		
3835	99.75		
3836	31.50		
3837	12.00		
3839	10.50		
3840	13.50		
3843	5.00		
3845	5.00		
3846	.60		
3848	1.20		
3849	.30		
3850	9,856.04		
3851	75.00		
3852	35.00		
3853	20.00		
3857	2.00		
		$10,653.29	
		$3,549.29	
			$13,815.57

EXHIBIT A.—SCHEDULE No. 2

SECURITIES (BONDS) DECEMBER 31, 1917

Face Value		Book Value
$6,000	Southern Railway. 6 $1000 5% registered gold bonds, #M257-247-475-476-477-478, due 7/1/1994	$6,000.00
2,000	Washington Railway and Electric Co. 2 $1000 4% 50 year gold bonds, consolidated mortgage, due 12/1/1951, #2183-2184	2,000.00
18,000	Northern Pacific and Great Northern R. R. 8 $1000 joint bonds registered 4%, due 7/1/1921, #M13253-4-11171-13255-11172-11769-11770-11771; 2 $5000 C. B. & Q. collateral registered 4%, due 7/1/1921, #V5199-5401	18,000.00
12,000	Northern Pacific Ry. 4 $1000 3% registered gold bonds, #M1610-1-2-1650; 1 $5000 3% registered gold bond, #1123; 3 $1000 3% gold bonds, #M216543-4-5, general lien, due January 1, 2047	12,000.00
9,000	B. & O. R. R. Company. 1 $5000 1st mtge. 4% 50 year gold registered, due 2/17/1960, #A436; 1 $1000 1st mtge. 4% 50 year gold registered, due 2/17/1960, #M1230; 3 $1000 prior lien 3½%, due 1925, #SM383-4-5 ($7,894.09 of these bonds belong to the Reserve Fund.)	9,000.00
2,000	Potomac Electric Power Co., 5%, due June 1, 1929, #833-4	2,000.00
7,000	New York City, registered 4¼%, due March 1, 1962, #588	7,000.00
5,000	3½% Liberty Loan bonds, registered, due June 15, 1947, #6033-4-5-6-7	5,000.00
3,000	4% Liberty Loan bonds	3,000.00
$64,000		$64,000.00

EXHIBIT A.—SCHEDULE No. 3

ACCOUNTS RECEIVABLE, DECEMBER 31, 1917

Back dues	$1,253.00
Subscriptions	3.00
Advertisements	378.62
Extra publications	20,437.00
	$22,071.62

EXHIBIT A.—SCHEDULE No. 4

CERTIFIED CHECKS, DECEMBER 31, 1917

Aug. 11.	Secretary of the Navy			#3516	$150.00
22.	"	"	"	3529	686.00
Oct. 1.	"	"	"	3618	1,125.00
3.	"	"	"	3636	250.00
22.	"	"	"	3667	3,155.00
31.	"	"	"	3683	2,490.00
Nov. 18.	"	"	"	3734	660.00
28.	"	"	"	3780	1,525.00
					$10,041.00

EXHIBIT A.—SCHEDULE No. 5

ACCOUNTS PAYABLE, DECEMBER 31, 1917

Lord Baltimore Press	$9,815.10
Longmans, Green and Co.	3.46
Harper and Brothers	41.72
D. Van Nostrand Co.	237.99
McGraw, Hill Book Co.	12.75
R. Beresford	1.56
U. S. Infantry Ass'n	30.70
National Geographic Society	1.00
John Wiley and Sons	3.75
Barse and Hopkins	5.32
J. B. Lippincott Co.	8.41
Putnam's Sons	2.69
Dodd, Mead and Co.	1.94
Little, Brown and Co.	3.28
Geo. H. Doran Co.	1.18
Methodist Book Co.	.73
E. P. Dutton and Co.	5.65
Lemcke & Beuchner	4.50
Doubleday, Page and Co.	2.39
N. W. Henley Pub. Co.	.82
R. M. McBride & Co.	2.39
McMillan Co.	6.47
Meyer and Thalheimer	24.20
Steckney and Montague	12.00
James Gantt	6.66
C. and P. Telephone Co.	3.00
Underwood and Underwood	15.00
Phila. Mfgs. Mutual Fire Co.	80.00
Postmaster, Annapolis, Md.	3.91
Lucas Bros.	11.20
Black and Company	100.00
Wells, Fargo and Co. Express	50.47
Sundry authors (royalties)	5,575.97
Sundry credits (overpayments)	115.20
	$16,191.35

EXHIBIT A.—SCHEDULE No. 6

INCOME AND EXPENSES FOR THE YEAR ENDED DECEMBER 31, 1917

Inventory, January 1, 1917.			
Extra publications	$7,012.58		
Extra numbers of Proceedings	300.00		
		$7,312.58	
Add: Purchases for year.			
Books for sale	$3,100.18		
Printing and binding proceedings	14,154.26		
Printing and binding extra publications	51,707.44		
		68,961.88	
		$76,274.46	
Deduct: Inventory, December 31, 1917.			
Extra publications	$9,314.26		
Extra numbers of Proceedings	300.00		
		9,614.26	
			$66,660.20

EXHIBIT A.—SCHEDULE No. 6.—Continued

Expressage, freight and hauling	$1,864.55	
Contributors	3,938.75	
Authors of books (royalties)	5,039.72	
Prize essay award	200.00	
Honorable mention award	175.00	
Postage and telegrams	489.84	
Engraving prize essay, medal and case	23.20	
		$11,731.06
Cost of publications sold		$78,391.26
Profit on sale of publications, etc.		21,026.89
		$99,418.15

EXPENSES

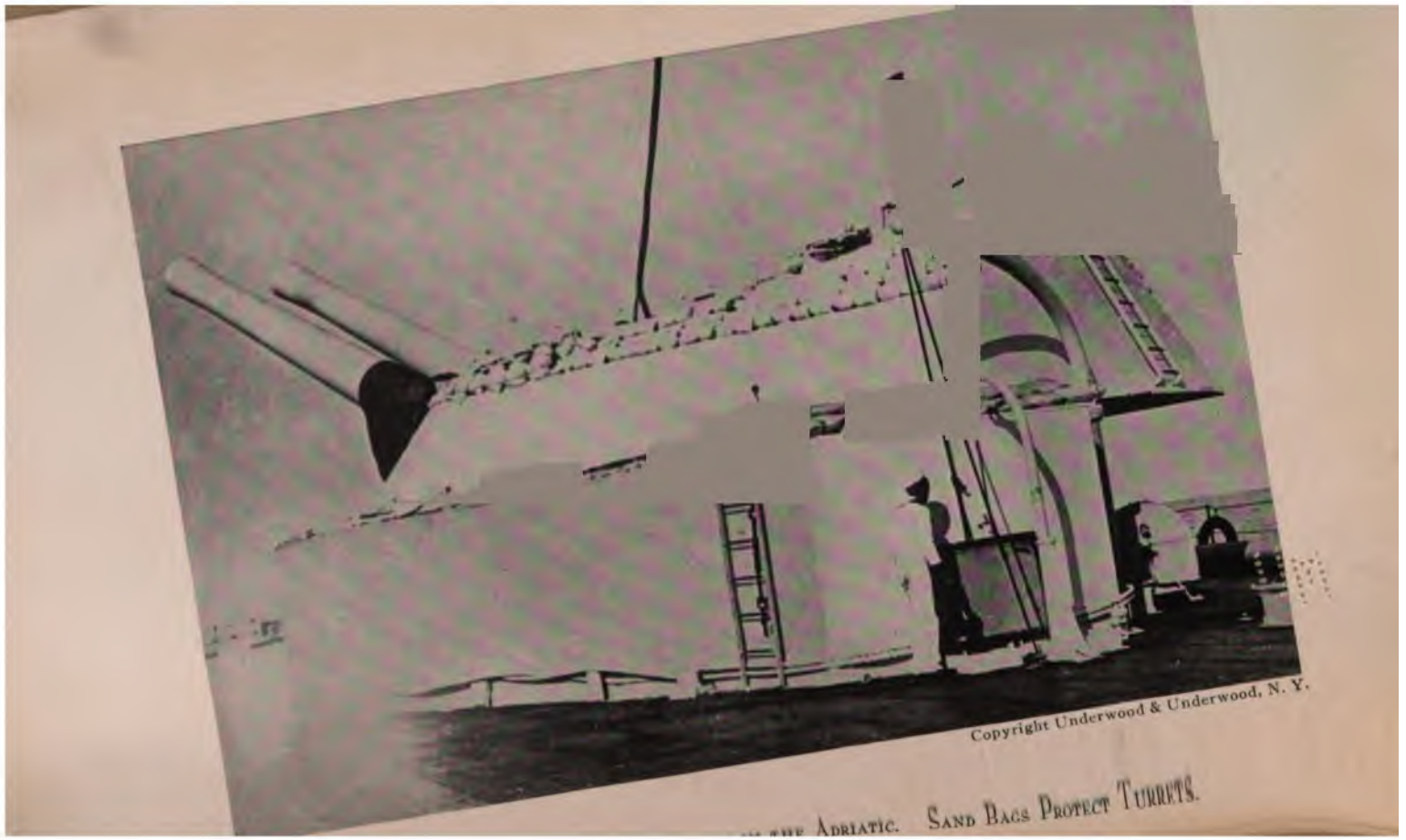
Salaries	$5,820.50	
Office expenses	721.13	
Board meetings	416.00	
Insurance	80.00	
Stationery	543.85	
Advertising	271.60	
Life members	30.00	
Total expenses		$7,883.08
Excess of income over expenses transferred to surplus		22,307.29
		$30,190.37

INCOME

Sale of extra publications	$92,820.35
Sale of books	2,554.30
Sale of proceedings	206.25
Total sale of publications	$95,580.90
Subscriptions	2,390.05
Advertisements	1,362.12
Binding	85.08
Total sale of publications, etc.	$99,418.15
Profit on sale of publications, etc.	$21,026.89
Dues	6,100.69
Interest on investments	3,062.79
	$30,190.37

This report of audit was accepted and approved by the Board of Control, for publication, January 10, 1918.

I. C. KIDD,
Secretary and Treasurer,
U. S. Naval Institute.



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... THE ADRIATIC. SAND BAGS PROTECT TURRETS.

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT W. B. JUPP, U. S. Navy.

GENERAL ARRANGEMENT

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NOTE.—Ship construction in the nations at war is held confidential and no reliable information is available.

ARGENTINA

PROTEST NEW BARRED ZONE.—A number of Argentina newspapers consider that the extension of the German barred zone to include the trade routes between South America and Europe is an unfriendly act toward that country. The papers renew their demands that the government sever relations with Germany.—*N. Y. Times*, 12/1.

GREAT BRITAIN

BIG INLAND HARBOR PLANNED BY BRITAIN.—For a considerable time there have been reports that the British Board of Admiralty had had before it definite plans for a big ship canal to join the firth of Clyde to the west coast of Scotland. These reports are now confirmed. They provide for a canal from the firth of Forth to Loch Lomond and thence out to Loch Long, an offshoot of the firth of Clyde, and so to the open sea. The Mid-Scotland Ship Canal National Association has been informed that the Admiralty is disposed to favor the Loch Lomond route on naval grounds. The association has been working hard for a long time past in favor of a canal by another route altogether.

At present the Loch Lomond route seems to be most in official favor. This route would take the canal from the firth of Forth, as far up as that estuary is navigable for large vessels, by way of low-lying ground to the southern end of Loch Lomond. The northern end of Loch Lomond is only separated from Loch Long by two or three miles of land, and it would be an easy matter to cut through these two or three miles and join the inland loch to the sea loch, and so to the firth of Clyde.

In order to make the waterway capable of carrying large war vessels it would be necessary to raise the level of Loch Lomond by about 22 feet and a number of locks would be required between Loch Lomond and Loch Long, as well as elsewhere on the canal. It would not be by any means a sea-level canal, and therein would lie one of its principal disadvantages.

The "direct route," on the other hand, would be from Grangemouth to a point on the River Clyde a few miles below Glasgow, and by it a canal would be on the sea level. No locks would be necessary anywhere, but there would have to be a "seagate" at either end, so that the rise and fall of the ocean tides would not affect the level of the canal. The Mid-Scotland Ship Canal National Association claims for this route many advantages as compared with the route by way of Loch Lomond. It would follow very largely, if not almost wholly, the line of the present Forth and Clyde barge canal, which in its turn follows the natural valley which joins the firths of Forth and Clyde. It would pass through or near the majority of the most important industrial areas in the Scottish midlands, and its western end would be right in the middle of the great Clyde shipbuilding area, to which war vessels could be taken from the new naval base at Rosyth for overhaul or repair.

Loch Lomond is a large and beautiful stretch of water, and if its level is raised by 22 feet it will provide sufficient depth for the largest of warships. It is likely that the authorities have in their minds the conversion of Loch Lomond into a great inland naval base, from which war vessels could emerge to either coast, as they might think fit. There is something remarkably attractive in the idea of having great squadrons of British battleships, battle cruisers, light cruisers, destroyers and submarines moored in absolute safety away up among the highland hills, far from the dangers of the ocean and also from the dangers of enemy attack, but ready at any moment to slip out either to the Atlantic or the North Sea. There is nothing impracticable in the idea, while there are no insoluble engineering difficulties.—*Washington Star, 27/12.*

SIR JOHN BECOMES PEER AND IS SUCCEEDED BY SECOND SEA LORD.—London, December 26.—Vice Admiral Sir Rosslyn Wemyss has been appointed First Sea Lord, in succession to Admiral Sir John R. Jellicoe, according to an official announcement issued this evening.

Vice Admiral Sir Rosslyn Wemyss was appointed Second Sea Lord of the British fleet last summer. He has a distinct reputation as a fighter of the first order throughout the British Navy. He was born in 1864.

He took a foremost part in the Jutland battle and acquitted himself admirably. He comes of one of the old conservative families of England, being a son of the late J. H. Erskine Wemyss, of Wemyss Castle, Fife. He entered the navy in 1877, was made a lieutenant in 1887, a commander in 1898 and captain in 1901. He was commander of the Royal Naval Barracks in 1911 and 1912, rear admiral of the second battle squadron in 1912 and 1913 and was an extra equerry to the King.

Vice Admiral Wemyss represents the old aristocratic element. As Second Sea Lord he was responsible chiefly for the appointment of the personnel of the navy, and he was undoubtedly taken as first assistant to Admiral Jellicoe because of his knowledge of men and his reputation as a fighter.—*N. Y. Herald, 27/12.*

NEW BRITISH WARSHIPS.—M. Rousseau, the naval expert of the Paris *Temps*, writes that on a visit to the yard of the Fairfield Ship-Building and Engineering Company, Ltd., Goven, he saw, with wonder and amazement, "the extraordinary dimensions of certain new British warships, beside which the size of the *Queen Elizabeth* and *Tiger* would seem very modest." Although complete discretion was observed, he adds that as to actual size one need only to remark that the slips on which these two earlier vessels had been laid down had to be enlarged to realize that the new types were bigger than the old.—*Nautical Gazette*, 3/1.

WHAT BRITISH SHIPS CARRY.—Ninety-one per cent of the tonnage of British ships is now reserved for war munitions, grain and other government supplies. Seven per cent is reserved for cotton, canned goods and other essential shipments. The remaining 2 per cent is unrestricted.—*Marine Journal*, 12/17.

MORE MEN FOR BRITISH NAVY.—A supplementary estimate issued on November 26 provides for the addition of 50,000 officers and men to the navy during the current financial year. The original number voted for 1917-18 was 400,000, so that, with the increase now asked for, the total strength will be raised to 450,000.

At the outbreak of war the establishment stood at 151,000 of all ranks.—*Army and Navy Gazette*, 12/1.

BRITISH NAME NAVAL BOARD.—The new Admiralty Board is announced officially. There is nothing sensational or dramatic about the list of names, and only one naval member of the board was not serving at the Admiralty when Admiral Sir John R. Jellicoe was the head. He is Rear Admiral Sydney R. Fremantle, who becomes deputy chief of staff to Vice Admiral Sir Rosslyn Wemyss, the new First Sea Lord.

Archibald S. Hurd, the naval critic, in commenting on the new board, says it is apparent that no revolutionary disturbance of the main lines of the naval policy is indicated. He adds that behind the new board is the reorganized war staff, for which some of the most brilliant younger officers have been chosen.—*Washington Post*, 13/1.

NEARLY 10,000 LIVES LOST ON BRITISH MERCHANT VESSELS.—It is announced that the number of lives reported as lost on British merchant vessels owing to enemy action from the beginning of the war until June 30 last is 9748.—*Marine Engineering*, January, 1918.

GERMANY

NEW GERMAN CRUISER.—On September 15 a Berlin telegram reported that a large cruiser had been launched at Danzig that day, and named the *Graf von Spee*, after the admiral who commanded the German ships in the action off Coronel, and was lost in the Falklands battle. Prince Henry of Prussia made the baptismal speech, and the widow of the late admiral, Countess von Spee, christened the vessel.—*Journal United Service Institution*, November.

NEW GERMAN SUBMARINES.—Early in September news from Copenhagen stated that Germany was in possession of a number of submarines of a new type, 340 feet in length, with a tonnage of 1500. It was said that they carried 40 torpedoes and a large number of shells and mines.—*Journal United Service Institution*, November.

LARGER GERMAN SUBMARINES.—According to advices received in this country from abroad, the impression prevails among British naval officers that the Germans have designed and constructed and are about to place in action an underwater craft of increased power, capable of vastly extended radius of action and endurance, with the expectation that these vessels will be capable of enlarging their zone of operation to American waters.

It is understood that the new submersibles are considerably larger than the *Deutschland* and can store enough oil to carry them 9000 miles or more, while they also can carry an abundant supply of torpedoes.

Moreover—and this is not their least important feature—the living quarters have been greatly improved. Each member of the crew has almost double the amount of cubic space that could be allotted in the earlier types, the ventilation is superior, and the broad decks enable the men to take exercise. It is doubtful if life on board a destroyer would be any more comfortable than on such a submarine.

That such a big, ocean-going submarine may prove an awkward customer is admitted, but it will not become particularly formidable until in the open sea, and even there the boat will not be as immune as the Germans seem to think. A submersible craft, whether a tiny coastal boat or a 3000 tonner, is subject to the same inherent limitations. If the boat is detected when submerged, the large one is equally at the mercy of the various devices that were devised for the destruction of the small boat, and the large one is under the same disadvantages during the brief interval that must elapse between changing from submersion to surface trim.

German writers lay great stress on the formidable armament of the new U-cruisers, which are reported to carry 6-inch guns, and they assume that with such an armament such a raider may boldly come to the surface and accept an artillery duel with any armed merchant ship or even with a destroyer. However, in the first place, it is doubtful whether 6-inch guns have been mounted on any underwater craft yet built, for there are technical difficulties to be overcome in connection with the mounting of really heavy guns in the submarines, and the best-informed authorities do not accept the German stories on this point.

It might be possible to devise an arrangement to carry a gun of 6-inch bore, but it would have to be a short, low-velocity weapon, which would be inferior in range to the standard 4-inch gun. It is well to remember that the latest 6-inch gun is more than 25 feet in length; also that the gun and its carriage are very heavy.—*Washington Post*, 6/1.

GERMANY'S NEW U-BOATS—A SPANISH DESCRIPTION.—On the supposition that anything throwing light on the construction and equipment of Germany's submarines will prove of interest, we publish a brief description translated from a Spanish weekly. The article makes the astonishing statement that the latest type of U-boat can go around the world without having to replenish its fuel supply—a statement which can hardly be accepted as authoritative. The article follows:

"The latest large German underseas boats are so well equipped that they are able to go around the world without having to replenish the fuel supply for their motors. The motor engines on these new U-boats have been so improved and have developed such a horsepower that they are in every respect equal to the type of engine now installed on fast cruisers.

"Other nations do not possess, so far as known, this novel and intricate class of engines, for they have been unable so far to connect up more than 1000 horsepower double-phase or quadruple-phase motors in 6-cylinder units, and to secure at the same time absolute safety of operation, combined with the maximum speed and power of endurance. The combustion motor

is just as capable of being kept in motion and of having its speed accelerated when under as when above water. The combustion gases are passed over a composition of calcium, whereby they lose their water and carbonic-acid contents. To the passive elements of these combustion gases there is then added so much oxygen as is necessary for perfect combustion. Naturally this oxygen has to be taken aboard in a very compressed form, and for this purpose flasks are used. In this method of propulsion a battery composed of flasks filled with oxygen takes the place of a storage battery.

"It can be easily seen that this system possesses no inconsiderable advantages as regards weight over the method of propelling submarines by electricity.

"However, the most important thing of all is that an almost noiseless motor has been created. Enemy vessels equipped with the most effective underwater sound detectors and such as will give warning of the approach of a vessel driven by ordinary motive power, even while it is a great distance off, and perhaps invisible, will pass by a submarine proceeding under water without being aware of the presence of the undersea boat. On the other hand, a German submarine, even when under water and not making use of its periscope, is promptly notified when a vessel is near at hand.

"Mention should also be made of the fact that thanks to the latest improvements, namely, through the employment of oxygen-flask batteries, the interior of a submarine is made a much more pleasant place of sojourn for those on board. They are no longer obliged to suffer from having to inhale poisonous vapors, combustion gases, and oil exudations, which formerly made life on a submarine almost intolerable, especially in cases of long cruises under water, or of enforced submersions for safety."—*Nautical Gazette*, 27/12.

ADDITIONAL SECRETS OF THE SUPER-ZEPPELINS.—With the dismantling of the Zeppelin *L-49* which was forced to land at Bourbonne-les-Bains and captured practically intact by the French on that eventful day when five or more German air raiders came to grief, further details concerning the construction and equipment are now available.

It is understood that the present intention of the French authorities is to exhibit the more interesting parts of the *L-49* at the Invalides in Paris, where so many war relics and trophies have been exhibited since August, 1914. Later the reconstruction of the gigantic German dirigible will be attempted; this task, it is now believed, will require several months of painstaking effort. At any rate, the dismantling operations have brought to light many details which were overlooked in the preliminary inspections of the craft, just after it had landed on a hillside.

The framework of the present super-Zeppelin contains three distinct varieties of aluminum, namely, pure aluminum, aluminum alloyed with zinc, and duralumin. The last-mentioned variety is a well-known alloy of copper, manganese, and about 93 per cent aluminum; and although its weight is about equal to that of pure aluminum, it has three times the tensile strength. The framework of the *L-49* has been estimated at 600 feet in length, 75 feet extreme diameter, and with a capacity of 55,000 cubic meters.

Along the bottom of the huge bag runs a triangular-shaped passageway walled in by a light metal framework, with its apex at the top. The gas bags fold over the triangular framework of this passageway, so that anyone passing through it is virtually surrounded by the gas bags on two sides and the aluminum framework and outer covering, surmounted by the footway, underneath. This gangway or "cat-walk" forms the keel of the big cigar-shaped bag, and serves to connect the various power plants and gun platform of the Zeppelin, with the forward or commander's quarters. The passageway is usually quite dark; but the footway is provided with a hand rail, while at intervals along the framework members small disks of radium

paint serve clearly to mark the way. Indeed, control dials and sign boards in the main passageway and the branch passageways are provided with radium dials and characters, making the use of dangerous lights unnecessary.

Aside from affording a means of communication between various parts of the aerial leviathan, the "cat-walk" serves as sleeping quarters and as storage space. The sleeping quarters are represented by a number of hammocks supported a few inches above the outer fabric cover, to one side of the pine board-walk. Fuel tanks and ballast tanks are suspended from the framework on either side of the board-walk, and it appears that the bombs are also supported in the passageway. The fuel reservoirs are

FRONT END OF THE COMMANDER'S QUARTERS OF THE ZEPPELIN "L-49," SHOWING THE VARIOUS CONTROLS.

aluminum cylinders of 300-liter capacity, and are suspended in groups of two or three. Means are provided for readily releasing these tanks through trap doors in the bottom of the passageway, in the event that every pound of weight which can be spared has to be dropped to lighten the Zeppelin so as to ascend rapidly. Tubes connect the fuel tanks with the engines in the nacelles below, and aside from the main fuel tanks a number of others, not piped to the engines, are kept on hand as an emergency supply.

The ballast reservoirs which replace the former sand bags are made of waterproof cloth and provided with an aluminum spout at the bottom. Each ballast unit has a capacity of 1000 liters of alcoholized water, and it is of interest to note here that the freezing of this liquid ballast prevented the *L-49* from making for the higher altitudes to escape hostile battle-planes, after the gas supply had become seriously depleted through long flight. The ballast reservoirs are suspended from the framework of the "cat-walk" by means of steel cables.

Four nacelles house the engines—two laterally suspended near the center of the airship, and one near each end. The rear nacelle carries two motors, one of which is an emergency unit. In the former description of the *L-49* the statement was made that each nacelle carried two engines which could be employed singly or in tandem in driving the propeller. This statement, it now appears, only applies to the rear nacelle, all the other nacelles being

provided with a single engine and propeller. Each engine is rated at 240 horsepower, making a total of 1200 horsepower for the airship. Each propeller measures 5 meters in diameter. The nacelles, which are more or less egg-shaped, are occupied mostly by the engines, and it is reported that little space is left for the tenders; in truth, the crew in this respect are working under conditions no more enviable than sailors aboard a German U-boat.

The front nacelle is divided into two compartments, the forward or commander's quarters provided with sliding plate-glass windows in front; and the rear or engine room. The commander's quarters appears in one of the accompanying illustrations, and it will be noted that all the controls of the

ONE OF THE "POWER EGGS" OR NACELLES READY FOR TRANSPORTATION.

huge airship are centered here. Among the instruments appearing in the view are a compass and the steering wheel in the center, the bomb-sighting apparatus at the right, with a tank of compressed oxygen just below, and the commander's parachute rolled up at the left. By means of a keyboard the cargo of bombs can be dropped one by one, while a battery of electric lamps shows which bombs have been released. A signal telegraph permits of instant communication with the various engine rooms.

That the present super-Zeppelin is a vast improvement over its predecessors is evident from a study of its lifting power, which is said to be 60 metric tons. This is distributed about as follows: Framework, 30 tons; two middle nacelles, 2 tons; two end nacelles, 4 tons; fuel for 24-hour flight, 7 tons; equipment and accessories, 1 ton; 19 passengers, 1½ tons; bombs, 2 tons, making a total of 47½ tons. This leaves a margin of 12 tons of lifting power, which is ample for all navigating conditions.

The crew comprises 19 men and two officers, who are posted as follows: Two in each of the middle nacelles, three in the rear nacelle which contains two engines, and four in the front nacelle. The remaining members are placed in the passageway or "cat-walk," where they take care of the ballast tanks or snatch a few hours' sleep until called upon to relieve other men. The crew of such a craft, it goes without saying, must be composed of exceptional men—men who can withstand extreme cold, lack of oxygen, and constant nervous strain.—*Scientific American*, 22/12.

U-BOATS UNDER SEPARATE BUREAU.—An imperial decree prescribing fo the duration of the war the formation of the new section in the Germa Imperial Navy Department to be called the U-Boat Department has jus been published, according to an Amsterdam dispatch to Reuter's, Limitec The new department deals solely with U-boat affairs, which heretofor have been handled by the dockyards section of the Navy Department.— *N. Y. Herald*, 17/20.

GERMAN MUTINIES.—More trouble in the enemy naval forces is reporte It is a curious thing that discontent in a military nation usually appear first in the navy. The Russian Navy is the latest example of this, th mutinies on the Black Sea warships being the first serious forerunners o successful revolutionary movements. Why this should be true is no clear. But possibly it is due to the fact that a warship is a separate unit and that, once a crew is organized for trouble, it can pretty well pursu its own course. From the outside, it would seem as if a post on the Ki fleet would be about as tempting a position as exists to-day in the arme forces of Germany. There is a minimum of danger and a maximum o leisure.—*Montreal Star.*

GERMAN NAVAL GUNNERY.—Russian newspapers recently to hand giv interesting details of the naval engagement in the Gulf of Riga, arisin out of the German attack on the Oesel, Moon, and Dagoe islands. appears that the Russian battleships *Slava* and *Grazdanin* (ex-*Tzarevitch* were engaged by a German dreadnought division, consisting of four ship of the *Kaiser-Koenig* class. The enemy opened fire at a range of 15,00 meters on the Russian ships, and upwards of 200 12-inch projectiles wer discharged without scoring a single hit. Observing the ineffectivenes of their fire, the Germans closed the range to 12,000 meters, which wa just beyond the range of the antiquated guns mounted in the Russia squadron. Out of a large number of salvos fired at this reduced distanc the *Slava* was hit by two 12-inch shells. She sustained no vital injur but a conflagration was caused, and under the vigorous German cannonad it was impossible to get it under. In the end the commanding officer o the *Slava* ordered the sea-cocks to be opened, and the ship went dow with her colors flying, after the entire crew, including the wounded, ha been transferred to destroyers. The *Grazdanin* was also hit several time but was not seriously injured. Towards the close of the action the Germa ships came within range of the heavier Russian guns, which registere several hits. In this unequal action the German gunnery appears have been very indifferent.—*The Engineer*, 7/12.

TERRIBLE CONDITIONS IN TOWNS OF GERMANY.—Chancellor von Hertli made his first appearance as a member of the Prussian cabinet in t Prussian upper house on Tuesday to support the housing bill. He s the conditions which had grown up around the large German towns a industrial centers were such as might fill the members of the house w serious anxiety, real pain and occasional sorrow. Not only had the ma tenance of repairs to houses been impeded and the increase of hous facilities become almost impossible, but the government desires to pro homes for returning soldiers which will be adequate and healthy.

Dr. Dernburg, speaking on the same bill, said that the conditions in large towns were terrible and must be abolished. The decline in number of births had been very great and the mortality of children un 12 months had been still worse.—*Evening Star*, 17/1.

GERMAN DOUBTS U-BOAT SUCCESS.—Captain Persius, the German na writer of the *Berliner Tageblatt*, takes a rather gloomy view of the su marine situation in his article of November 8. He says General Hinde burg on July 2 predicted that "the war is won for us if we withsta

enemy attacks until the submarine campaign has done its work." The only thing lacking, comments Captain Persius, is the submarine "work." Captain Persius says there seems to be little proof that England is being starved, making the trite remark:

"Just as the German people does not allow itself to be starved straight away, so it is with other peoples," and then he observes: "It may hardly be assumed that a scarcity of food will induce England to sue for peace in the next half year."—*Washington Post*, 23/12.

VON TIRPITZ FULL OF GLOOM.—A gloomy picture of Germany's future was painted by Grand Admiral Von Tirpitz in his recent speech in Essen, according to the *Hamburg News*. Regarding a successful economic war against Germany after the war, he said:

"Imagine the position if we simultaneously have to bear the burden of taxation which must fall on every German and, despite the fallen value of German money, we still have to buy the most necessary food and raw materials from abroad. Can anyone in his heart of hearts really believe that in these circumstances, without an increase of power, without indemnity and without security, we could avoid Germany's ruin?"

Germany's plight at the hands of England he bemoaned as follows:

"Not only has England taken our colonies and Mesopotamia, but everywhere she has made deeper and firmer bases for her maritime and colonial supremacy. She has tarnished and trodden down the prestige and honor of Germany by unprecedented calumnies. In the whole transatlantic world we are considered as conquered and done for."—*Baltimore Sun*, 29/12.

NEW KRUPP PLANT IN SWITZERLAND.—According to a dispatch from Geneva, Switzerland, the Krupps have opened a branch factory at Lucerne with a capital of $7,500,000. Among the directors are Arthur Krupp and Counsellor Ernest Hauer, director of the principal Krupp factory at Essen. The Swiss law demands that when new enterprises are established in Switzerland their objects shall be set forth; and complying with this the company declares its purpose to be the fabrication of arms, cannon and munitions of war; the acquisition of factories, mines and metals, and also their sale. There is evidence that Germany realizes that the concentration of her munition and armor plants in the Essen district, which is only some 40 to 50 miles from the German frontier, is a permanent risk; and during the war, particularly during the latter phases, she has been developing large munition factories at points more remote from danger.—*Scientific American*, 29/12.

PROMISES KIND TREATMENT FOR AMERICAN PRISONERS.—The following statement has been issued by the Wolff bureau, the semi-official news agency in Berlin:

"The report is published from American headquarters that the Germans intend to treat American prisoners systematically worse than British, French and Italian prisoners, and is based allegedly on an official German statement that Americans are hard of understanding and unable to conduct themselves like gentlemen. Such an official statement was never made.

"American prisoners will be treated just as kindly and considerately as all other prisoners."—*Evening Star*, 9/1.

JAPAN

JAPAN'S SINGLE AIM.—While the eyes of the world are at present directed to United States shipping operations in the North Atlantic in rushing supplies and troops from this country to France to help win the world war, a glance at what is going on in the Pacific is enlightening, to

say the least. In 1914, for example, our trade with Japan amounted to $158,000,000 in value. Of this, $81,000,000 worth was carried in Japanese vessels. In the year just closed, our trade with Japan had increased to $338,600,000, while the amount of exports and imports carried in Japanese vessels was $529,000,000. In other words, vessels flying the Japanese flag carried *all of our trade with Japan* in 1917 and $200,000,000 of our trade with other Far Eastern countries.

Anyone who has observed the Japanese policy in regard to her merchant marine since the outbreak of the European war is aware that that government has pursued without a single deviation the policy of creating a great merchant marine which would enable Japan to participate largely in the future control of the world's trade when the war is over. To this end ships to fly the Japanese flag have been built as rapidly as possible, and from the beginning of the war Japanese shipping has side-stepped the war zone. The Japanese steamship lines have not been commandeered by their government as have ours, and when the war is over they will be ready to go right on, while readjustment must be made in the United States from government to private control—another disadvantage for American shipping added to the many it is already laboring under when brought into competition with foreigners under normal conditions.

As a result of Japan's wise shipping policy, the Japanese Steamship Company announced recently that its capital will be more than doubled in the near future, from $22,000,000 to $49,000,000, and that it has plans in hand for building 50 vessels, mostly freighters, aggregating some 400,000 tons.' It is the purpose of this company to extend its American and European passenger services, which plan is made possible by a permanent subsidy to be received from the Japanese Government. The increased capital will be in effect in March. Were we making the most of our present opportunity, similar announcements by American steamship lines would be forthcoming.—*Maritime Journal*, 12/1.

PORTUGAL

A MUTINOUS OUTBREAK ON THE PORTUGUESE BATTLESHIP *Vasco de Gama* was checked by artillery fire from a fort in Lisbon harbor after the warship had fired a few shots at the land battery, according to a government announcement, January 9.

The crew in part was landed and disarmed, surrendering to the army and the republican guard, and government forces later gained possession of the battleship.

Measures taken to insure the maintenance of order are declared to have been effective. The statement issued by the government reads:

"The *Vasco de Gama* having left the Santos docks against the government's formal orders and having taken a position in the Middle Tagus before Fort St. George, a battery in the fort opened fire on the cruiser, which replied with a few shots and then hoisted the white flag. Parts of crews of other ships landed some men from the crew who, after being disarmed, surrendered to the republican guard and the army on Commerce Square and at the naval arsenal.

"The government took immediate measures to insure the maintenance of order and the *Vasco* complied. The latter now considers the prevalence of order completely assured.

"The *Vasco de Gama* is already in the government's hands."

A revolution occurred in Portugal early in December, the government capitulating to the rebels after three days' fighting during which 70 persons were reported killed and between 300 and 400 wounded. A new government was formed under Dr. Paez, the revolutionary leader, and President Machado, of the republic, was banished. The movement appears to have been prompted by dissatisfaction with the alleged inefficiency of the old government. There had previously been numerous strikes and riots attributed

largely to food scarcity and high prices, and any monarchist influence in the uprising was denied. The new government pledged itself to continue cordial support of the cause of the Entente Allies.—*Baltimore American*, 10/1.

UNITED STATES

NAVAL VESSEL CONSTRUCTION.—Little has been done at the Navy Department in the matter of preparing new designs for warships of the larger classes, besides the accumulation of information derived from the experiences of the allied fleets that will be valuable when that work is taken up. This is because of the fact that the greater part of the naval construction next year will be confined to building destroyers, minesweepers and other small craft, which can be completed and placed in service in a shorter time and for which there is a continuing demand in the plans for meeting the submarine menace.

It is considered to be more advisable to adhere to this policy and suspend all work on the larger vessels, which will be pushed to completion later on when the rush of work on the smaller craft lessens.

Everything in the way of ship construction is being standardized as far as possible, in order to simplify the work and expedite completion. As rapidly as destroyers are placed in service and fitted out, they are being sent abroad, and in this connection officers that have commanded the older destroyers in foreign waters are returning to this country to take out the latest types.—*Washington Post*, 23/12.

THE DESTROYER BUILDING PROGRAM is making rapid progress. Through an agreement with the Shipping Board priority has been obtained for destroyer construction, the Navy Department in return affording priority for the construction of larger merchant ships, supplying ways and slips and permitting a delay in the building of larger naval vessels authorized by Congress. Parts of destroyers are being built in plants in all parts of the country, shipped to certain destinations when completed and there assembled, thus making possible the more rapid construction of the boats. The navy has not been seriously affected by the labor situation, which is causing distress to some industries. It is said that the navy yards have twice as many workmen employed now as they had a year ago, and that during the last six months they have made shipbuilders out of mechanics who before were not fitted for the construction of ships. Plants for the building of destroyers are being erected at several places, consisting chiefly of additions to existing plants, and it is hoped to have these soon in operation.—*Shipping*, 15/12.

U. S. SUBMARINE FLEET.—Chairman Padgett of the House Naval Committee, says that within a year the United States will have a submarine fleet as good as that of Germany or better.

"The number of submarines now under construction is a naval secret," he said, "and all that can be said is that the 138 which are being built under the authorization of the program of August, 1916, are only a part of the whole number."—*Evening Star*, 18/1.

SUBMARINE CHASERS TO BE COMPLETED BY MARCH.—Although the submarine-chaser program of the Navy Department has been delayed by slow delivery of engines, it was stated to-day, it will be completed by March 1. When the contracts were let it was believed the work could be done by January 1.

The number of boats involved has never been made public. A considerable number are already in service, however, some of them having been turned over to France and most of the remainder are more than 85 per cent completed. No more are to be built as they are regarded as useful only for inshore work.—*N. Y. Herald*, 15/1.

UNITED STATES NAVY.—Surveys of possible aviation, submarine and navy-yard sites south of Cape Hatteras and in the Gulf of Mexico, including Key West, recently were made by the navy-yard commission, of which Rear Admiral James M. Helm is chairman, and a final report of this commission, which also during the past year has investigated suitable locations for naval purposes in practically all sea-coast parts of the country, will be submitted to Congress some time this winter.

In its preliminary report, the board expressed the opinion that immediate steps should be taken to improve the navy yard at Charleston, S. C., so as to permit full utilization of its docking and repair facilities for work of all kinds within the limits of the capacity of the dry dock and the depth of the water that can be maintained, without undue annual expenditure, in the channel approaches from the sea.

Notwithstanding occasional damage from hurricanes, the board indicates the desirability of using the Pensacola yard as an aeroplane station, for which purpose it now is being employed. It is practically closed as an industrial yard for general service of the fleet, but the board recommends its additional limited development as a base for submarines and destroyers.

The board does not favor the development of the station at New Orleans as a first-class naval base, but believes that it has possibilities as a naval station for the repair and maintenance of light-draft vessels operating in the Caribbean Sea and Gulf of Mexico, especially as a base for submarines, destroyers and auxiliary vessels in time of war.—*Washington Post*, 17/12.

NEW RECORD BY DESTROYER.—A new record for sustained endurance has been established by one of the new "flush-deck" destroyers, the Navy Department announced, January 16.

The voyage was from a Pacific to an Atlantic port and occupied 10½ days, the average speed being 19.15 knots. A new record also was set in the construction of the destroyer, only 51 weeks elapsing from the laying of her keel to the date of launching.—*N. Y. Times*, 17/1.

SECRETARY DANIELS ON THE NAVAL FLYING CORPS.—In his report to the House Sub-Committee of the Naval Affairs Committee as well as in the discussion which followed, Secretary of the Navy Daniels gave the following information regarding the expansion of the Naval Air Service:

The increase in the naval aircraft material has been approximately 1400 per cent; in personnel, 3000 per cent; in stations and training schools, 3200 per cent, and better results are steadily obtained. An estimate of 10,000 machines and 5000 aviators is well within the correct number to be expected for next spring.

The naval aircraft factory at Philadelphia which was completed within 90 days, is about 400 feet long and has a floor space of approximately 140,000 square feet. It is expected to produce something like 1000 machines a year of the smaller type, or perhaps one-half that number of the larger type, when in full operation. In addition to relieving other manufacturers for army work, the naval aircraft factory will conduct experimental work. The production end will also supply the navy with correct figures as to the cost of machines and so protect the service as to expenditures.—*Aviation*, January.

U. S. NAVY

PRAISES BUREAU OF NAVY ORDNANCE.—The war activities of the Navy Department, especially the preparations made by the Ordnance Bureau, under Rear Admiral Ralph Earle, are told in detail, so far as is consistent with military policy, in a statement made, January 13, by Representative William B. Oliver, chairman of the special committee investigating the work done by the navy in the war. The statement is based to a great extent on

the testimony given before the committee in executive session by Rear Admiral Earle and Commander Thomas A. Kearney, assistant chief of the bureau.

Representative Oliver prefaced his summary of the accomplishments of the Navy Department with the statement that the committee had been so impressed by the activities of the Ordnance Bureau that it had directed him to make a summary of what had been ascertained in the hearings, most of which were held behind closed doors.

Since the war began the expenditures of the bureau have increased from $3,000,000 a year to more than $560,000,000, and the experts have been called upon to develop new materials and inventions. More than 1100 vessels, the statement says, have been equipped with armor and armament since the fitting out of the *Campana*, on March 14, 1917.

While the Ordnance Bureau of the War Department refused to approve the Lewis gun, the navy's Ordnance Bureau conducted a test of this weapon in April, 1917, and as a result ordered several thousand of these guns. The second detachment of marines which left for Europe was entirely outfitted with the Lewis gun, and "recent reports from the war zone indicate that this gun is giving entire satisfaction."

Representative Oliver's summary of the important activities of the navy follows:

The importance of the readiness and adequacy of the navy's ordnance cannot be over emphasized. Upon this efficiency depends the success of our overseas operations. Guns that will shoot straight, shells that will penetrate the thickest armor, powder that is dependable are the essential requisites of naval supremacy. Ships and men without guns and ammunition are useless.

The bureau, so far as could be learned, has fully satisfied the demands made upon it by the vessels operating in European waters. A letter from Vice Admiral Sims compliments the work and spirit of the Ordnance Department. Other officers in the war zone, writing in similar vein, have given like testimony.

As a preliminary to its hearings, the committee visited the offices of the Bureau of Ordnance and personally examined into the organization and operation of the bureau's administrative details. The committee was most favorably impressed with the business organization, capacity, and capabilities of the bureau to handle expeditiously and efficiently the important war work that comes under its immediate cognizance—the procurement of guns, mounts, shells, powder, fire-control instruments, and the numerous accessories required in the arming of our naval forces.

The organization of the bureau in time of peace had been developed so as to make it an organization for war, with the result that, notwithstanding the enormously increased demands and responsibilities recently placed upon it, that organization is working smoothly and efficiently, notwithstanding the fact that the expenditures have increased from about $3,000,000 to more than $560,000,000. It has gradually been augmented by taking into it retired officers, officers of the naval militia, officers of the coast-guard service, former graduates from Annapolis, and able men from civilian life as needed.

Despite the pressure placed upon the bureau by the demands for more ordnance material of standard type, it has been able to develop much new material, including large depth charges, new submarine bombs, non-ricochet shells, bomb-dropping sights, howitzers, guns for throwing depth charges, smoke-screen apparatus, heavier ordnance on aircraft, and many other important designs which the bureau feels it unwise to disclose, and made much progress on essential articles of lesser importance.

Where there were shortages in the market of various materials, the bureau took steps immediately to develop new sources of supply. It placed contracts rapidly, and the committee is confident that the navy's needs for

ordnance during this war are fully covered by existing contracts and with the capacity now under its control.

Over 1100 vessels have been furnished and equipped with guns, ammunition, spare parts, and all their auxiliaries since the fitting out of the *Campana*, the first ship to be so fitted out, on March 14, 1917.

Reserves of ammunition and shell have been acquired; and money placed at the disposal of the Bureau of Ordnance, the committee finds, has been spent wisely and has been obligated practically as soon as it became available. The testimony convinced the committee that the prevalent belief and opinion as to the navy's readiness was well founded. The Bureau of Ordnance had for years been preparing for war.

Guns, mounts, shell, powder, and ordnance equipment in large quantities had been manufactured and held in readiness for eventual use. With the declaration of armed neutrality, guns and ammunition were promptly placed on the merchant ships of the United States. Upon the declaration of war, telegrams long held in readiness were put on the wire and the wheels were in motion—without a jar the machinery took up the load placed upon it. There has been no breakdown, no let-up. On the contrary there has been increasing speed and greater momentum.

New capacities have been developed for the production of gun forgings and the larger types of broadside gun mounts; firms that prior to the declaration of war had been engaged solely in commercial work have been induced to specialize in ordnance production with most gratifying results. Practically all the contracts made by the Bureau of Ordnance have been on a fixed-price basis as the result of competitive bidding, less than 10 per cent being on a cost plus a fixed-profit basis; cost being as defined by the internal revenue act, and the profit being per pound of gun forgings, or per gun, or per mount.

The navy's industrial ordnance plants have been and are being expanded as rapidly as practicable without interfering with their production. The results of much of this expansion will be felt this spring in the increased deliveries of all types of ordnance material. Without direct control of the gun factory, torpedo station, naval proving ground, powder factory, and ammunition depots, the work accomplished would have been impossible.

It may be pertinent to here state that the bureau has furnished in appreciable quantities the governments of England, France, and Italy with guns from the largest to the smallest caliber, together with proper supplies of ammunition therefor, and is continuing the supply of such munitions to our Allies. In addition to vessels of the regular navy of our Allies, it has armed a considerable number of their merchantmen.

Anticipating the needs of the naval service and Marine Corps for additional machine guns, the bureau wisely conducted a test of the Lewis machine gun early in April, 1917, with a view to definitely determining its serviceability when using the United States small-arms ammunition, and as a result of this test, placed an order for the manufacture of several thousand of the guns. Each company of marines leaving for foreign service has been provided with its proper quota of machine guns, the second detachment being entirely outfitted with the Lewis infantry machine gun, and recent reports from the war zone indicate that this gun is giving entire satisfaction.

Depth charges, which the committee thinks may be properly termed "the terror of the submarine," have been produced in quantity, and are in use by our destroyers and submarine chasers. An adequate reserve of ammunition for all classes of guns has been accumulated, and is held in storage ready for the use of the fleet.

It was specially gratifying to note that the skill, ingenuity, and inventive resources of the bureau have been productive of new designs demanded by the present methods of modern warfare. Advantage has been taken of every suggestion, irrespective of its source. Intimate contact has been established and maintained with the ordnance bureaus and fleets of the

allied nations, the greatest freedom of interchange of information and material being the order of the day. The relationship with army ordnance, Signal Service, Aircraft Production Board, and the Shipping Board has been most intimate and cordial.

The committee was gratified at the executive ability shown by naval officers placed in charge of industrial work. As an illustration, the bureau found it necessary to commandeer a plant producing binoculars and other optical instruments for the navy. Under the former management this plant produced but 168 standard binoculars in two months, whereas during the first two weeks of operation under navy management it has produced 600 satisfactory binoculars for the use of lookouts and for spotters.

The committee made special inquiry as to the damage done to torpedoes at the Bliss works. It ascertained that no torpedoes or damaged parts had found their way into service, that spare parts for torpedoes, such as gyro wheels, had been tampered with, but this was promptly detected by the naval inspector of ordnance and a close watch was maintained upon these articles, with the result that the perpetrator of the damage, one Paul Charles Hennig, a native of Leipzig, Germany, who had been in this country since 1908, has been arrested and is now awaiting trial.

Slight cuts by files had been made in the glass-hardened steel bearings for gyro wheels, and in other cases emery had been placed in bearings and bearing cups. Some fifteen gyro wheels in all were damaged. Exhaustive inspections were made of naval torpedo material, with the result that none of the damaged parts is in any completed torpedoes, either in storage or on board ship.

The committee found that, despite the necessity of placing large emergency orders for material, every effort has been made to insure reasonable prices.

The committee was supplied with full information of how many attacks of submarines upon armed merchantmen had been warded off by the ships' gun crews using the battery with bravery and skill and was given the details of certain engagements of special interest.

The arming of merchantmen and the use of other devices, including sailing in convoys, while doing much to keep down our percentage of losses, are not all that can be desired as a check to the submarine menace. The committee was furnished with the names, tonnage, and armament of all vessels under the American flag engaged in transatlantic trade, together with dates and incidents of all encounters with submarines. The record of attacks on our armed merchantmen shows a comparatively small percentage were successful and that the chances of escape when a submarine is sighted, before she has time to fire a torpedo, are very high, due to the efficiency of the navy personnel.

The unseen torpedo is responsible for 80 per cent of the sinkings.

Admiral Earle referred to the estimates which the secretary had furnished the committee for certain projects that will increase the efficiency of the navy's Bureau of Ordnance, and when these needs are provided the committee had unquestioned faith in its ability, its officers, and personnel to meet the growing demands and responsibilities which the war has imposed upon them.—*N. Y. Times*, 4/1.

NAVAL INCREASE.—Secretary of the Navy Daniels, in testifying before the sub-committee of the Naval Affairs Committee, declares that the navy now has more than 1000 ships in commission as against 300 two years ago, and an enlisted personnel of 280,000 officers and men compared with 64,680 men and 4376 officers when America declared war.—*Literary Digest*, 5/1.

NAVAL EXPANSION.—Some idea of the efficiency of the Navy Department and how it has met the extraordinary demands of the present war crisis can best be gained from the utterances of the Secretary of the Navy in his annual report and before the investigating committee of Congress. From

a force of 4500 officers and 68,000 men enlisted in January, 1917, the navy has expanded to 15,000 officers and 254,000 enlisted men. Further expansions are inevitable. A year ago the navy had 130 stations of all kinds; it has now 363. The number of employees at regular navy yards has increased from about 35,000 to over 60,000. On shore and afloat the naval establishment embraces more than 300,000. At the beginning of the fiscal year 1917 the monthly expenditures for all naval purposes were about $8,000,000 (£1,640,000); they are now about $60,000,000 (£12,300,000). A year ago there were 300 naval vessels of all kinds in commission; to-day there are considerably more than a thousand. These typical figures sufficiently indicate the task the navy has had to accomplish in the way of expansion.

The ability of the navy, without friction or hurrying, to bring to bear its military force rapidly and to increase it threefold in a short time, is credited by the Secretary of the Navy to the system that had been built up in peace times and to the securing before the war of a larger building program extending over a term of years, as well as to the authorization of an increased personnel. Internally the efficient organization, working together for years as a trained team, made the Navy Department's rapid expansion easy, though it taxed the strength and energy of every department head and the entire personnel on shore and in the fleets. It goes without saying that such satisfactory progress in the fighting strength of the navy could not have been accomplished without corresponding efficiency in the business affairs of the department, and it is largely due to the improved business methods and purchasing systems developed that the Navy Department has been able to meet the tremendous and sudden demands of war and embark upon such unprecedented programs of construction and equipment without breaking down the business machinery of the department.

Secretary Daniels' message to the American people that "the navy has met its duties of the present and is preparing for those of the future" will be received with confidence and no interference with the efficient work of this branch of the government will be tolerated.—*Marine Engineering*, January.

RESTORED TO SERVICE 109 BADLY DAMAGED INTERNED SHIPS.—All the damage done to 109 German ships by their crews, prior to their seizure by the United States Government when war was declared, has been repaired and these ships are to-day in service, adding more than 500,000 gross tonnage to the transport and cargo fleets in war service for the United States.

There is evidence that a German central authority gave an order for destruction on these ships, effective on or about February 1, 1917, simultaneous with the date set for unrestricted submarine warfare and that the purpose was to inflict such vital damage to the machinery of all German ships in our ports that none could be operated for from 18 months to two years.

This purpose has been defeated in signal fashion. In less than eight months all the ships were in service.

The destructive campaign of the German crews cunningly comprehended a system of ruin which they believed would necessitate the shipping of new machinery to substitute for that which was ruthlessly battered down or painstakingly damaged by drilling or dismantlement. There is documentary proof that the enemy believed the damage irreparable.

To obtain new machinery would have entailed a prolonged process of design, manufacture, and installation. Urged by the necessity of conserving time the engineers of the Navy Department succeeded, by unique means, in patching and welding the broken parts and replacing all of the standard parts which the Germans detached from their engines and destroyed or threw overboard.

The mechanical evidence is that the campaign of destruction was operated on these ships for more than two months and that the Germans

were convinced that they were making a thorough job of it. Their scheme of ruin was shrewdly devised, deliberately executed, and it ranged from the plugging of steam pipes to the utter demolition of boilers by dry firing.

When the United States Shipping Board experts first surveyed the ruin the belief was expressed that much new machinery would have to be designed, manufactured, and installed, making 18 months a fair minimum estimate of the time required. However, at the Navy Department, where the need of troop and cargo ships was an urgent issue, officers of the Bureau of Steam Engineering, having faith that the major portion of the repairs could be accomplished by patching and welding, declared it was possible to clear the ships for service by Christmas, and the last of the fleet actually took her final sea test and was ordered into service as a Thanksgiving gift to the nation.

To accomplish this end the Navy Department secured the services of all available machinery welders and patchers, many of them having been voluntarily offered by the railroads.

Although explosives were not used in the process of destruction, the engineers of the Navy Department were always conscious of the danger of hidden charges of high explosives which might become operative and disastrous when the machinery was put to a test. Instances of artful pipe plugging, of concealing steel nuts and bolts in delicate cylinders, of depositing ground glass in oil pipes and bearings, of cunningly changing indicators, of filling fire extinguishers with gasoline and similar means of spoliation, were common enough to induce the engineers to make a rule calling for thorough overhauling. On each ship there was no boiler that was not threaded through every pipe for evidence of plugging, no mechanism of any sort that was not completely dismantled, inspected, and reassembled before it was finally passed as safe.

A memorandum written in German was picked up on one of the ships which gave a complete record of the destruction on that ship. Investigation revealed that the list, which had evidently been left through an oversight, was correct in every detail. The following is a translation of excerpts from this memorandum:

"Starboard and port high-pressure cylinder with valve chest: Upper exhaust outlet flange broken off (cannot be repaired)."

"Starboard and port second intermediate pressure valve chest: Steam inlet flange broken off (cannot be repaired)."

"First intermediate pressure starboard: Exhaust pipe of exhaust line to second intermediate pressure flange broken off (cannot be repaired)."

"Starboard and port low pressure exhaust pipe damaged (cannot be repaired)."

The parenthetical optimism of the German who was so confident of the thoroughness of his mutilation is now the source of much glee among naval engineers, inasmuch as every one of the supposedly irreparable parts was in fact speedily repaired and those engines are to-day as powerful and serviceable as when they left the hands of their makers.

The method of patching and welding broken marine engines had never before been practiced, although the art has been known in the railroad industry for 15 years. Three methods of patching were used; electric welding, oxy-acetylene welding, and ordinary mechanical patching, the latter often later being welded. Following the repairs tests of the machinery were first made at the docks, where the ships were lashed firmly to the piers while the propellers were driven at low speed and later each ship was taken to sea for vigorous trial tests. The patches and welds were reported as having given complete satisfaction.

When the *Leviathan*, formerly the *Vaterland* and the largest ship afloat, was put into commission by the United States Government and sent to sea for a trial run, her commander, a young American naval officer, was ordered to "exert every pound of pressure that she possesses, for if there is any fault we want to know it now." The *Leviathan* stood the test. She was one of the ships least mutilated, due to the fact that she was in bad

repair and it was believed that she would not be fit to put to sea for many months. The navy engineers found it necessary to overhaul and partially redesign and reconstruct many important parts of the engines.

The larger German ships which have been repaired and are to-day in commission as a part of the United States Navy, with their former German and their new American names, are as follows:

German Name	American Name
Vaterland	U. S. S. Leviathan.
Amerika	U. S. S. America.
Andromeda	U. S. S. Bath.
Barbarossa	U. S. S. Mercury.
Breslau	U. S. S. Bridgeport.
Cincinnati	U. S. S. Covington.
Frieda Leonhart	U. S. S. Astoria.
Frederic der Grosse	U. S. S. Huron.
Geier	U. S. S. Schurz.
George Washington	U. S. S. George Washington.
Grosser Kurfurst	U. S. S. Aeolus.
Grunewald	U. S. S. Gen. George W. Goethals.
Hamburg	U. S. S. Powhatan.
Hermes	U. S. S. Hermes.
Hohenfelde	U. S. S. Long Beach.
Keil	U. S. S. Camden.
Kaiser Wilhelm II	U. S. S. Agamemnon.
Koenig Wilhelm II	U. S. S. Madawaska.
Kronprinz Wilhelm	U. S. S. von Steuben.
Kronprinzessin Cecilie	U. S. S. Mount Vernon.
Leibenfels	U. S. S. Houston.
Locksun	U. S. S. Gulfport.
Neckar	U. S. S. Antigone.
Nicaria	U. S. S. Pensacola.
Odenwald	U. S. S. Newport News.
Praesident	U. S. S. Kittery.
Praesident Grant	U. S. S. President Grant.
Praesident Lincoln	U. S. S. President Lincoln.
Prinzess Irene	U. S. S. Pocahontas.
Prinz Eitel Friedrich	U. S. S. Dekalb.
Rhein	U. S. S. Susquehanna.
Rudolph Blumberg	U. S. S. Beaufort.
Saxonia	U. S. S. Savannah.
Staatssekraetar Solf	U. S. S. Samoa.
Vogensen	U. S. S. Quincy.

The ships taken over and repaired by the Shipping Board, with their German and American names, are as follows:

German Name	American Name
Allemannia	Owasco.
O. J. D. Ahlers	Monticello.
Adamsturm	Actæon.
Arnallas Vinnon	Chillicothe.
Atlas	(No name.)
Armenia	(No name.)
Arcadia	(No name.)
Andalusia	(No name.)
Adelheid	(No name.)
Bulgaria	(No name.)
Borneo	Nipsic.
Bohemia	Artemis.
Bochum	Montpelier.
Bavaria	(No name.)
Calabaria	(No name.)

German Name	American Name
Carl Diederichsen	Raritan.
Clara Jebsen	Tioga.
Clara Mennig	Yodkin.
Cobelenz	Sachem.
Constantia	(No name.)
Dobek	Monongahela.
Darvel	Wamsutta.
Elmshorn	Casco.
Elsass	Appelas.
Esslingen	Nyanza.
Farn Gerraux	Farn Gerraux.
Gouverneur Jaeschke	Watoga.
Holsatia	Tippecanoe.
Harburg	Pawnee.
Indra	Tonawanda.
Johanne	Iosco.
Koln	Anphion.
Kurt	Mochulu.
Loongmoon	Coosa.
Lyeemoon	Quantico.
Mark	Suwanne.
Mia	Oconee.
Magdeburg	Neuse.
Mattador	Montauk.
Marudu	Yazoo.
Nassovia	Isonomia.
Neptun	Minnow.
Ottawa	Muscoota.
Olivant	(No name.)
Ockenfels	Pequot.
Prinz Eitel Friedrich (Hamburg-American Line)	Ostewgo.
Prinzess Alice	Matoika.
Pennsylvania	Manasemond.
Pisa	Ascutney.
Pongtong	Quinnebaug.
Portonia	Yucca.
Prinz Joachim	Moccasin.
Prinz Oskar	Orion.
Prinz Sigismund	General Gorgas.
Prinz Waldemar	Wacouta.
Pommern	Rappahannock.
Rajah	Rajah.
Rheatia	Black Hawk.
Sachsen	Chattahoochee.
Sachsenwald	General Ernst.
Sambia	Tunica.
Savoia	General Hodges.
Serrapis	Osage.
Setos	Itasca.
Staatssekretar Kraetke	Tacony.
Steinbek	Arapahoe.
Suevia	Wachusett.
Camilla Rickmers	Ticonderoga.
Tsin Tau	Yuma.
Jubingen	Seneca.
Wasgenwald	Wasgenwald.
Wiegand	Midget.
Willehad	Wyandotte.
Wittekind	Iroquois

Every one of these ships was found to be either deliberately damaged or rendered useless through the ravages of neglect before they fell into the hands of the United States Government.

The most serious typical damage was done by breaking cylinders, valve chests, circulating pumps, steam and exhaust nozzles on main engines, and by dry firing boilers and thus melting the tubes and distorting the furnaces, in at least one instance probably using thermit to make the destruction complete.

There were many instances of minor and easily detectable destruction, such as cutting piston and connecting rods and stays with hack saws, smashing engine-room telegraph systems, and the removal and destruction of parts which the Germans evidently believed could not be replaced. The most insidious sabotage was that which was concealed. In plugging a steam-pipe the method was to disjoint the pipe and insert a solid piece of brass which would be sawed off flush with the joint. The pipe would then be reconnected, showing no evidence of having been tampered with.

Indicators were astutely reversed in many instances. Numerous fire extinguishers were found to be filled with kerosene and gasoline. Piles of shavings and refuse were strewn about where fires might be started, open cans of kerosene being found in several of these incendiary traps. There had evidently been a plan to burn the ships under certain conditions and it is believed that the German crews were seized and interned somewhat in advance of their expectations.

The case of the *Vaterland* was quite different from that of any other ship. Engineers of the Navy Department who examined the big liner declared that inferior engineering had been practiced in her construction. She has four turbine engines ahead and four astern on four shafts. All of the head engines were found in good condition and all of the astern engines were found damaged.

The major portion of the damage was credited more to faulty operation than to malicious intent. Cracks were found in the casing of the starboard high-pressure backing turbine of such size as to make it certain that the engine had not been used on the vessel's last run. Certain documentary evidence found on the ship corroborated this belief. It also indicated that the *Vaterland* on her last trip had made less than 20 knots.

There was just enough evidence of mutilation to warrant full investigation, and the vast mass of machinery, electric apparatus, and piping in the *Vaterland* was patiently and doggedly examined before she was sent to sea. Original defects in her engine equipment were corrected, she was overhauled and in many respects refitted, and on the whole she was declared a better ship when she entered the service of the United States than when she took her maiden voyage.—*Official Bulletin*, 31/12.

ORDNANCE AND GUNNERY

INVENTIONS WHICH MEET THE NEEDS OF MODERN WARFARE.—Because of the extensive employment of machinery in the world war, the inventor has the opportunity as never before to serve his country in his own favorite way. For the struggle in which we are now engaged has long been recognized as a contest between the great minds of the Central Powers and the Allied Powers—between inventors of both camps.

Typical of the inventions which the war has developed are those shown in the illustrations herewith. The first example is a shell for cutting barbed-wire entanglements, which is designed to travel through the air with the ease of the ordinary shrapnel or high-explosive shell until it reaches the target. Most wire-cutting shells have never proved practical for the reason that their wire-cutting members are actuated when the shell leaves the cannon, with the result that the added wind resistance of these members greatly limits the range and interferes materially with the accuracy of the projectile. In the present case the two hook-shaped wire-

cutting members are hinged as shown, and normally fit into slots in the shell case, where they are held by a soft metal band. The time fuse in the nose of the shell is set for any given distance, and serves to detonate a small charge just back of it. The explosive charge, in turn, pushes down a cone-shaped plunger which spreads out the wire-cutting arms. The cutting members are held in place by other members as indicated.

In order to make shrapnel more effective, especially when used against hostile aircraft, Edward Dartford Holmes of Huddersfield, England, has

THESE MILITARY INVENTIONS, IN THE ORDER SHOWN, ARE A WIRE-CUTTING SHELL, A MULTIPLE-CHARGE SHRAPNEL SHELL, AND A HAND GRENADE WHICH IS MADE "ALIVE" BY THE REVOLVING OF ITS SAFETY ARMS.

BY PASSING THIS SPHERICAL GRENADE THROUGH A CONTACT-MAKING TUBE, IT IS MADE READY FOR USE.

invented the multiple-charge shrapnel shell shown in the second illustration. Briefly, his scheme calls for a shrapnel shell containing a number of compartments which are each exploded in turn at predetermined intervals. And in order that the gunners may follow the progress of the explosion, each chamber is filled with a charge which will emit a different colored smoke. Two types are shown, one with the time fuse in the base, arranged to explode base-charge first and nose-charge last, and the other where the fuse is in the nose and connects with the separate charges by means of a long tube filled with a priming composition.

Numerous schemes have been suggested for making hand grenades safe for everyone except the enemy. A typical case is presented in the third illustration, which shows a hand grenade equipped with the usual safety pin and, in addition, safety arms. When the grenadier is ready to use the grenade, he removes the safety pin at the top. However, in this particular hand grenade the firing pin is screwed into the member which holds the safety arms in place, and it cannot disengage itself except by the rotation of the arms. In practice it appears that when the grenade is hurled, the safety arms rotate a few times and so release the firing pin, making the missile "alive." The safety arms, of course, drop to the ground. Should the grenade be dropped accidentally, or should it strike near friendly positions, the arms do not have sufficient time to rotate and release the firing pin, hence the grenade does not detonate.

For a similar purpose but employing electricity instead, the last illustration represents the scheme of Maurice Velin of Rambervillers, France, for making hand grenades safe until hurled at the enemy. In brief, the grenade in this case is round and consists of two metallic parts insulated one from the other and electrically connected by a fusible member, embedded in black powder. The black powder charge, in turn, connects with the explosive charge by a time fuse which may be regulated to suit conditions. As the grenades are required they are passed through a square wooden tube every side of which carries a contact spring that projects into the passageway. The contacts being connected to opposite poles of a battery, it follows that no matter how the spherical grenade passes through the wooden tube the circuit between any two contacts is closed and current passes through the fuse.—*Scientific American*, 22/12.

WEAR IN BIG GUNS.—In the current number of *Arms and Explosives* Major T. G. Tulloch (late R. A.) gives an article of much interest at the present time dealing with the wear of large guns. As the author points out, the wear of such guns has a most important influence on the cost of the war, not only on account of the expense of effecting repairs but because such wear leads to inaccuracy of fire and so increases the amount of ammunition expended to attain a definite objective. On this point he says, "In short, if a few thousandths of an inch of steel at the commencement of the rifling of guns, etc., could be prevented from wearing away in so short a time as at present, the reduction in the cost of the war, so far as guns, ammunition, transport, etc., are concerned, is almost incalculable." In dealing with this matter, Major Tulloch differentiates between the damage to the bore near the breech end—damage for which he retains the usual term "corrosion"—and that near the muzzle which he prefers to call "erosion" as it is a purely mechanical effect. The causes which produce the first-named class of damage are complex, and include the effects of temperature, the form and dimensions of the powder chamber, the chemical and physical qualities of the powder used, the weight of charge and rapidity of fire, the gas escape past the projectile, and the composition and physical properties of the steel used for the inner tubes of the gun. All these matters present many points of interest and they are discussed clearly in the article with which we are dealing. Major Tulloch attaches much importance to the evolution of methods for securing the effective sealing of the gas escape immediately after the firing of the charge, and he makes some suggestions as to the lines on which such a device may be designed. As regards the physical properties of the steel used for the inner tube, Major Tulloch considers that the heat treatment should be subject to the analysis of the steel and the forging effect, and he urges the necessity of obtaining more effective forging of the portion of the tube forming the bore, and suggests certain methods of securing this result. With regard to the erosion near the muzzle due to frictional wear and metallic fouling, it is pointed out that to secure good shooting it is desirable to prevent such fouling by all practicable means, such as slightly bell-mouthing the bore, and, as indicati-

of the importance of this matter, he states that by electrolytic methods over 15 pounds' weight of copper have been removed from the bore of an 8-inch gun after firing just over 100 rounds. In concluding his most interesting article, Major Tulloch remarks that it was written to invite discussion and to call attention to certain matters requiring systematic investigation, and we much hope that it may have this result.—*Engineering.*

THE NEW MACHINE-GUN CARRIAGE OF OUR MARINES.—Among the latest equipment of the United States Marines is a new type of machine-gun carriage which strongly suggests the little dog-drawn carts and machine guns used by the Belgians in the early days of the war, with such telling effect. But in the present instance the carriage is drawn by two men, and in this respect it more closely resembles the machine-gun carriages of the Russian troops.

MOUNTED ON A TWO-WHEELED CARRIAGE, THIS LEWIS MACHINE-GUN UNIT OF THE U. S. MARINES IS HIGHLY MOBILE.

Rapidity of motion is obviously the leading feature of the new carriage, for it is provided with two ball-bearing and rubber-tired wheels. A shaft, provided with a double handle, permits two men to pull the carriage, which mounts a Lewis machine gun. The ammunition drums are carried in square steel boxes, just below the gun. In order that the gun may be used to the best advantage, its mounting is such as to provide the utmost freedom of movement. In lightness and mobility this device speaks for itself.—*Scientific American,* 15/12.

A NEW FRENCH GUN.—In order to combat the German machine guns the French of late have introduced a new quick-firing cannon of such construction that it can be readily carried forward by attacking infantry, says the *United Service Gazette.* Thus the skirmishers are able to put enemy machine guns out of action by well-directed shots from their 37-millimeter cannon, which they can carry along with them. The French "37" is a befitting companion to the famous "75," which has figured so prominently in the French campaigns to date. The smaller weapon has every feature of its larger brother, including quick-firing breech mechanism, accurate sights and automatic recoil. Lying out on open ground, two men can fire up to 35 high-explosive shells per minute. The shells measure about 1½ inches in

diameter, and the gun has a range well above a mile for accurate shooting. This odd little field piece can be readily taken apart and carried by six or eight men, and is available for use in advanced positions as well as in the open. It is a most workmanlike piece of armament for use under the conditions prevailing on the western front.—*Scientific American*, 29/12.

A TRANSFORMER WHICH HEATS SHELL BANDS.—In most of the British shell-making plants an ingenious type of transformer is being employed for heating the copper shell-bands. Briefly, the transformer consists of a closed core of laminated iron, one leg of which is hinged and counterweighted so that it can be readily lifted to permit the copper band to be inserted over the primary winding. The copper band when once in position forms the secondary of the transformer, and because of the conversion of a small flow of standard lighting current into low tension but high amperage current in its single turn of winding, the copper band is heated in short order to the desired degree.—*Scientific American*, 29/12.

THE SUBMARINE DEPTH BOMB.—Its (the depth bomb's) destructiveness is based upon the fundamental fact that water is incompressible, and that the shock of detonating a mass of high explosive under water is felt immediately in all directions—the effect diminishing, of course, with the distance from the bomb. It will be remembered that in one of our earlier chapters on the submarine it was stated by Hudson Maxim that 4 cubic feet of trinitrotoluol at the moment of detonation produces 40,000 cubic feet of gas. Now, when a mine or bomb or torpedo war head is detonated the expanding gases seek the line of least resistance. In the case of a torpedoed ship this line leads into the hollow interior of the ship, the incompressible water forming an abutment in all directions; but when a mine or depth bomb is detonated the line of least resistance is upward, and the gases cut their way quickly to the surface, carrying a formidable mass of water to a great height into the air. If the explosion takes place at a considerable depth, however, the resistance to the upper escape of the gases is greater, and the shock transmitted through the water in all directions is proportionately increased. Failing to blow up the surface of the ocean, the bomb must blow up the submarine.

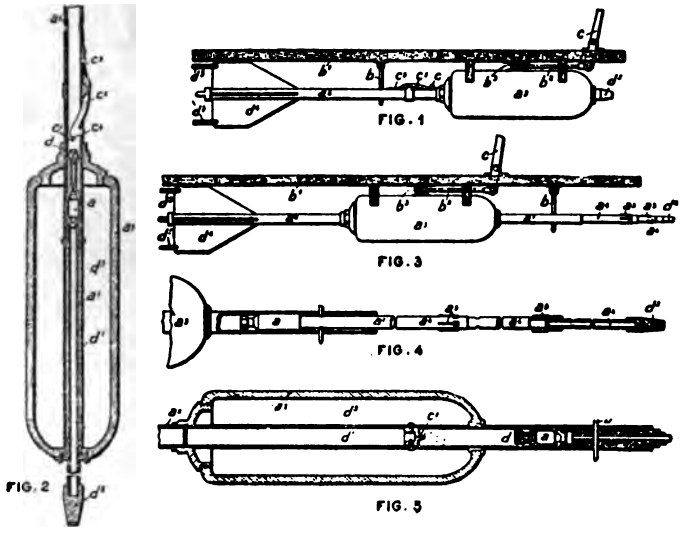
The destructiveness of the bomb against the submarine will depend upon two things: first, the depth at which it is detonated, and, secondly, the distance from the bomb to the submarine. Manifestly, then, it is advisable to detonate the bomb below the submarine, as the shock transmitted will be proportionately greater than if it were above it, other things being equal. As to the distance at which an explosion would be absolutely destructive, rupturing the plating and sinking the submarine, Mr. Hudson Maxim writes us that if 500 pounds of trinitrotoluol were exploded deep under water within 125 feet of a deeply submerged submarine it would completely destroy it. Smaller charges would, of course, have to be detonated proportionately closer to the submarine to secure destructive action.—*Marine Journal*, 17/12.

AIRCRAFT BOMBS.—The missiles which were dropped from aircraft in the early part of the great war were, for the greater part, bombs and grenades of obsolete types which had been formerly employed in field warfare. Their action was rather uncertain and their manipulation was often fraught with considerable danger.

A short time before the war broke out, the Vickers Works of England had, however, patented two types of aircraft bombs which were provided with a safety device that prevented their premature or accidental explosion. The destructive effect of these bombs also greatly exceeded that obtained with old-type missiles.

In the first type Vickers bomb the firing charge is held remote from the explosive charge until after the launching, and means are provided to cause

the bomb to explode at a previously determined distance from the ground or the target. For the latter purpose, the bomb is fitted with a "pilot," consisting of a metallic mass, which is suspended from the body of the bomb by a chain or a wire; the tension of this pilot cord is increased by a parachute, which slows down the bomb's vertical speed. The pilot cord is wound around a drum, which is connected with an aerial propeller, the latter being set in motion through the tension of the cord. When the cord is entirely unwound the spring of the percussion needle is, therefore, held in place only by the weight of the pilot, so that as soon as the latter strikes its objective the spring is released and drives the needle into the percussion cap of the firing charge, which in its turn acts on the explosive charge. The height at which the bomb is made to explode over a target is, consequently, determined by the length of the pilot cord, and can thus be adjusted at will.



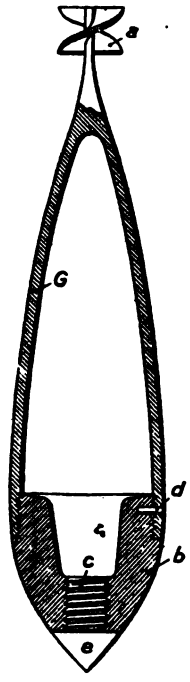
VICKERS PILOT BOMBS.

FIG. 1.—The Bomb Suspended from the Airplane Body. FIG. 2.—Longitudinal Cross Section of the Body of the Bomb. FIG. 3.—Side Elevation of a Collapsible Model of Pilot Bomb. FIG. 4.—Longitudinal Cross Section of a Collapsible Pilot. FIG. 5.—Longitudinal Cross Section of the Body of the Bomb, with Collapsible Elements Compressed.

FIGS. 1, 2.—a, Firing Charge; a_1, Pilot; a_2, Tail Piece; a_3, Shell of the Bomb; b, Locking Spindle; b_1, Airplane Body; b_2, Sliding Rod; b_3, Eye; c, Release Lever; c_1, Firing Pin; c_2, Spring Loaded Hammer; c_3, Spring; c_4, Stop; d_1, Tubular Firing-Pin Guide; d_2, Point of Pilot Rod; d, Percussion Cap; d_3, Explosive Charge; d_4, Stabilizing Fins; d_5, Parachute Cords.

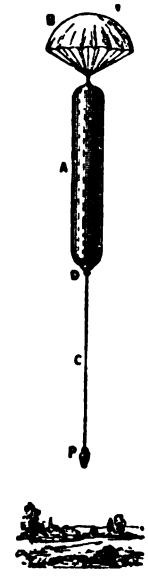
FIGS. 3, 4, 5.—a_1, Pilot Rod; a_4, Longitudinal Cross Section of Collapsible Rod; a_6, Spring Loaded Claws; b, Spindle; c_1, Firing Pin; a_3, Shell of the Bomb; a, Firing Charge; d_2, Forward End of Tube a_1; d_3 Explosive Charge.

In another type the mass of the pilot is composed of a cartridge with its percussion fuse and cap, and a fuse takes the place of the cord. On striking the target the cartridge sets fire to the fuse, and this, in its turn, sets fire



THE KUNKLER BOMB.

a, Revolving Vane; *b*, Head Piece; *c*, Threaded Detonator Socket; *d*, Set Screw; *e*, Body of the Detonator; *g*, Body of the Bomb.



PILOT BOMB WITH PARACHUTE.

A, Body of the Bomb; *B*, Parachute; *C*, Pilot Cord or Rod; *D*, Position of the Spring Which Is Tensioned by the Pilot; *P*, Pilot.

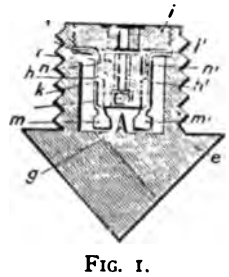


FIG. 1.

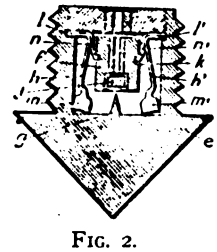


FIG. 2.

THE KUNKLER DETONATOR.

FIG. 1.—Before the Release. FIG. 2.—After the Release.

e, Head; *f*, Cap Holder; *g*, Firing Pin; hh_1, Springs; *i*, Plug; *j*, Percussion Cap; *k*, Groove; mm_1, Outer Springs; nn_1, Inner Springs, Clamping Cap Holder after the Outer Springs are Unlocked.

to the detonating charge. The latter object can also be attained by passing an electric current through the pilot, the current being furnished by accumulators housed in the bomb. The pilot cord is formed of two conducting wires, the mass of the pilot closing the current on contact with the ground. The charge is set on fire either by a spark or by an electro-magnet actuating the percussion needle.

In another type of bomb, also manufactured by Vickers, the pilot consists of a rod, which is carried through the body of the bomb in the longitudinal axis; a tail piece carries in the rear the firing charge and stabilizing fins.

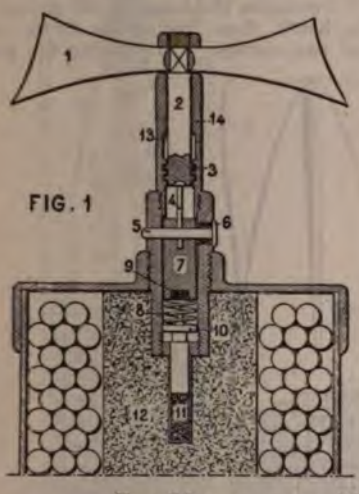


FIG. 1

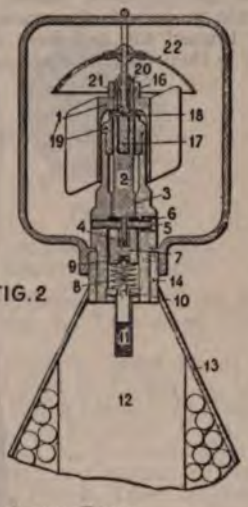


FIG. 2

TWO MODELS OF THE MACHENBACH BOMB.

FIG. 1.—*1*, Revolving Vane; *2-3*, Threaded Shaft; *4*, Extension Rod; *5*, Safety Gudgeon; *6*, Spiral Spring; *7*, Percussion Hammer; *8*, Percussion Spring; *9*, Percussion Cap; *10*, Percussion Needle; *11*, Firing Charge; *12*, Explosive Charge; *13-14*, Sleeve.

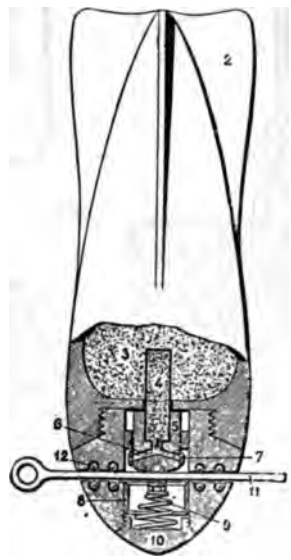
FIG. 2.—*13-14*, Sleeve; *7*, Percussion Hammer; *8*, Safety Spring; *9*, Percussion Cap; *10*, Percussion Pin; *11*, Firing Charge; *1*, Revolving Vane; *2*, Revolving Shaft; *4*, Pin; *5*, Safety Gudgeon; *6*, Spring; *16*, Lock Nut; *17*, Mobile Shaft; *19*, Guide Screw; *20*, Screw; *21*, Spring; *22*, Cap.

The rod rests on a suitable guide, which is locked when the bomb is inactive, but through which it is permitted to slide when the lock is removed. The firing charge is thus kept far apart from the explosive charge, so that even an accidental discharge of the firing charge is not likely to endanger the lives of the crew.

The bomb is suspended underneath the airplane in a horizontal position. By operating the lever which releases the bomb the safety lock is automatically removed and, as the bomb gradually assumes a vertical position, the pilot rod slides forward, and carries the firing charge into the center of the explosive charge. A spring-loaded percussion needle then slides into a suitable aperture provided for in the tail piece of the bomb and is ready for action. When the pilot rod hits the ground the impact makes it slide back in its guide; the firing charge is thus brought in contact with the needle and the explosion follows. To insure the free fall of the pilot rod when the bomb is released, the progress of the bomb is retarded by a parachute, while its course is steadied by stabilizing fins provided on the

tail piece. In some models the pilot rod is composed of a number of telescoping tubes, which develop their whole length under the gravitational speed. The telescoping elements are held in place, after they have reached their full development, by suitable block-devices.

In the Kunkler bomb the safety device is based on the action of the centrifugal forces developed during the fall of the bomb. For this purpose the bomb is provided, at the rear, with an aerial propeller which imparts to the bomb a rotary motion. The firing charge is lodged in the head of the bomb in a detonator, where it is held apart from the needle by means of two spring-loaded masses. As soon as the centrifugal force acquires a certain magnitude the masses will overcome the force of the springs and move toward the periphery of the bomb, thus freeing the firing charge which is then held in place only by two clamps. On striking the ground



THE PUTSCHER BOMB.

1, Body of the Bomb; *2*, Stabilizing Fin; *3*, Explosive Charge; *4*, Firing Charge; *5*, Percussion Hammer; *6*, Fuse Channels; *7*, Firing Caps; *8*, Friction Head; *9*, Spring; *10*, Plug; *11*, Safety Spindle; *12*, Ball Bearings.

the clamps will give way and drive the firing charge into the percussion needle.

The bomb patented by Richard Machenbach and the Carbonit Sprengstoff A. G. of Germany is a missile fitted with rotating fins, which answer the double purpose of stabilizing its path and of unlocking the firing mechanism only after the bomb has travelled a certain distance, thus insuring the safety of its manipulants. Although this is no novel principle, the patentees claim for their bomb a greater simplicity and a more efficient control than hitherto attained. The firing mechanism is provided with a further safety device in so far as the aerial propeller which unlocks the firing pin is allowed to rotate only after a given time has elapsed from the moment the bomb is released. The working of this bomb, two types of which are shown, is obvious from the accompanying diagrams.

In the Putscher bomb the firing mechanism is actuated, like in the foregoing types, by direct impact. The fuse is set on fire by means of friction

firing caps and the spring of the firing pin is blocked by a safety spindle, which must be removed before the release of the bomb.

The Bergery-Dercole bomb, which has been described in *Schuss und Waffe*, is of the rebounding type. This bomb consists of an external casing which is closed on its lower end and houses the body of the bomb proper. On striking the ground the case, which carries the firing charge, acts like

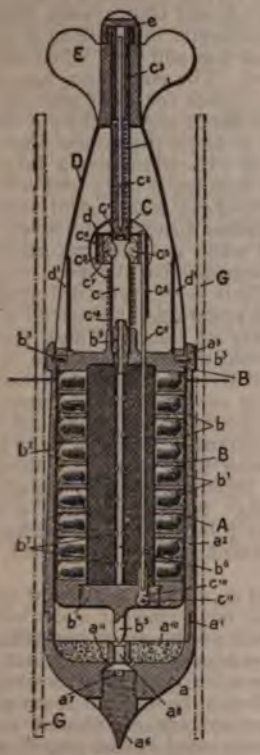


FIG. 1.

FIG. 2.

THE BERGERY-DEROCLE REBOUNDING BOMB.

FIG. 1.—Longitudinal Cross Section. FIG. 2.—Transverse Cross Section.

A, Casing; *a*, Head Piece; a_2, Tapered Part of Casing; a_3, Collar; a_{10}, Firing Charge; *B*, Hollow Cylinder; *b*, Projectile Ports; b_1, Projectiles; b_4, Projectile Retaining Sleeve; b_5, Catches; b_6, Plug; b_8, Firing Pin; b_9, Tube; b_7, Ports; *C*, Detonator; *c*, Detonator Guide; c_1, Firing Cap; c_2, Firing Pin Sliding in Tube c_3; c_4, Spring; c_{10}, Head of Rod; *D*, Shell Provided with Ports *d*; *E*, Stabilizing Fins Held in Position by Nut *e*; *G*, Launching Tube.

a mortar and imparts to the bomb proper a force opposite to that of its trajectory, causing it to rebound upon striking the target. The external and internal portions of the bomb are kept in their relative position, up to the moment the impact occurs, by suitable catches. When the outer case strikes the ground its motion is annulled, but the bomb proper, having a considerable inertia, will tend to continue on its path. The force thus generated unlocks the catches and drives the bomb with its firing pin against the detonating charge contained in the outer case, which then shoots out the bomb proper like a projectile is fired from a gun.—*Aviation*, 1/1.

OUR GREAT NEED FOR TOLUOL AND A NEW WAY TO MAKE IT.—The United States Government's needs for toluol for war purposes are just divulged as tremendous. A reliable estimate puts the figure at 22,000,000 gallons for the next 12 months. It is all to be converted into trinitrotoluol for high-explosive shells. Where this very large quantity is to come from has been

a source of considerable anxiety and is so still. Up to this time practic all of that needed has come from the by-product coke plants of the coun It appears as one of the by-products in coke-making and is recove along with benzol in the benzol recovery plants. The present avail output of the country from such plants for the next year is estimate 11,000,000 gallons or only 50 per cent of the quantity needed.

About two years ago, there was great interest manifested in the disco of a process for making toluol from crude oil, and claims were made while the production was not strictly a commercial one, still in a nati emergency, this process was the great back-log and that when the came, the material could be rapidly produced. The emergency has arri and the nation needs millions of gallons of toluol for itself and its A In the meantime, there has been going on without any publicity a deve ment in toluol manufacture which bids fair to be of the utmost import to the nation in the supply of trinitrotoluol. Early in 1915 a large c pany in Pittsburgh, which at that time was building a large number of product coke plants and, in connection with these, also benzol and tol plants, started in the laboratories at the Mellon Institute, an investigat into the recovery of toluol from carbureted water gas—the gas made in the large cities of the country by the gas companies for domestic use.

The conditions existing in water-gas plants were very different fr those in by-product coke plants, and special apparatus and special meth had to be devised for the successful recovery of toluol. These were installed in conjunction with the gaslight company at Washington, to ef the removal of toluol from 5,000,000 cubic feet of carbureted water per day. This plant was placed in operation on July 14, 1916, since wh date there have been secured approximately 200,000 gallons of toluol. W this plant was the first to use this process, and many improvements incre ing the efficiency and economy of operation have been introduced, plant has proved to be a commercial and technical success, equalling results promised by the laboratory methods. Since that time, a num of duplicate installations have been built as follows: two at Newark, at Paterson, one at Jersey City, two at Trenton, two at Rochester, on Chicago, and one at Evanston, Ill.

Now that the government has found what an enormous amount of to is required and that the trinitrotoluol is the most efficient and most sa factory explosive, the Ordnance Department of the army has taken h of the situation. It finds that every by-product coke-oven plant in country is producing or has arranged to produce toluol to its utmost pacity, and that the remaining needed toluol must be secured from city Seventy-two plants are available for this recovery distributed over entire country. The Pittsburgh company mentioned has arranged with government to build "stripping" plants in a number of large cities, many more are being designed and estimated upon. The plans for curing toluol from these sources involve the use of excess refining capa in all the by-product coke plants of the country.—*Scientific American*, 2

TRINITROTOLUOL POISONING is one of the greatest dangers to w munition workers are subject, and much interest therefore attaches at present time to the conditions under which such poisoning occurs and precautions that should be taken against it. A comprehensive paper on subject, by Dr. J. W. Schereschewsky, published in *Public Health Re* for November 16, deserves general distribution in the industry concer In loading shells with this substance there is constant opportunity nearly everybody connected with such work to become the subjec chronic poisoning through either the fumes or the dust of the subst The explosive is generally introduced into the empty shells in one of ways: the powdered substance is pressed into the shells by power pre or molten trinitrotoluol is poured into them. The latter method is the common and the more dangerous to the health of the workers.

poison is easily absorbed through the skin or it may enter the system by way of the respiratory tract. Young people are especially susceptible to its effects; no worker under 21 years of age should be employed in processes bringing him into contact with it. A complete suit of overalls, fitting closely at the neck, wrists and ankles, gloves and a cap covering the hair, should be worn by all workers. Men should keep their hair short and be clean shaven. Overalls should be laundered weekly. The eating of lunches and keeping of food in workrooms should be strictly prohibited. Lastly, there should be rigid supervision of all workers by a competent physician, familiar with the symptoms of poisoning and the precautions for preventing it.—*Scientific American*, 22/12.

SHIPSHIP MOUNTS POWERFUL MORTAR TO COMBAT U-BOATS.—A new type of mortar from which powerful bombs may be discharged at submerged U-boats was mounted upon the forward deck of a British steamship which arrived yesterday at an Atlantic port. It was an additional means of defense aboard the vessel and the passengers praised it highly. They had witnessed tests during the voyage from England.

The mortar is similar to those used in the trenches, but is much larger. Its muzzle points high in the air and the bomb ascends more than a thousand feet, then falls rapidly upon the spot where it is believed a U-boat is lurking. In the tests the crew experienced no difficulty in hitting any point selected, it was said by persons on board. The explosion which followed threw a mass of water high into the air.

The steamship also had mounted upon her decks her usual number of large-caliber rifles.—*N. Y. Herald*, 23/12.

GERMAN ARMOR RIDDLED.—The German soldier's armor will not withstand the hard-hitting American bullet, it has been shown. A heavy breastplate removed from a German prisoner for a test was literally chewed to pieces by machine-gun fire after a rifle bullet fired at a good range had torn a hole in the armor as big as a silver dollar.

Even the bullets from an automatic pistol did the work it was expected they would in this respect.—*Baltimore Sun*, 20/12.

ENGINEERING

REDUCING SPEED MAGNETICALLY.—A very ingenious gear has recently been invented for use in turbine-driven ships to permit a high-speed turbine to drive the propeller shaft at its most efficient speed. This gear is magnetic, and it operates on an entirely new principle. It can be designed for a great range of reduction ratios, the apparent limits being about 6 to 1 and 40 to 1, and the higher limit can be obtained in a single step.

The principle of the gear can best be understood by referring to the diagram, Fig. 1, which represents a typical design. Here we have the driven or primary field element *A*, which is rotated by suitable clutch connection with the turbine shaft. This field element, which consists of two poles, is energized by some suitable source of current. Surrounding it are two stationary cages or stators, *B* and *C*, the stator *B* consisting of magnetic bars of laminated sheet iron mounted on non-magnetic supporting rods, while the stator *C* is built up of toothed sheets of iron. The rods and teeth are magnetically energized as they come within the field of the primary element, so that as the latter rotates it sets up a wave of magnetism that sweeps around the stators. Between the stators is the driven member *D*, also made up of bars of laminated iron. It will be observed that there are 64 magnetic bars or teeth on each stator, while the secondary or driven member has 66; so that at only two points are the teeth of the stators and the secondary in alinement. With the parts at rest and under no load this alinement will be formed in the field of greatest magnetic flux—in other words, directly in line with the poles of the driving member, as shown at *E* in the diagram.

Now, let us suppose that the driven member is held stationary while the driving member is rotated to the position *F*, as shown in broken lines. As at this point the teeth of the stator and the secondary will be out of alinement, the magnetic force will set up a torque between the teeth which will only be satisfied when the secondary is permitted to rotate far enough to bring its teeth into coincidence with the teeth of the stator and at the point of greatest magnetic flux. In other words, while the driver is moving through the angle *A O F* the driven member moves through an angle *G O F*. In a complete rotation of the driver there will be a movement of the secondary through the space of two teeth; in other words, there will be a speed reduction of 33 to 1. Of course, the driven member will lag behind the driver by an amount depending upon the load it has to carry.

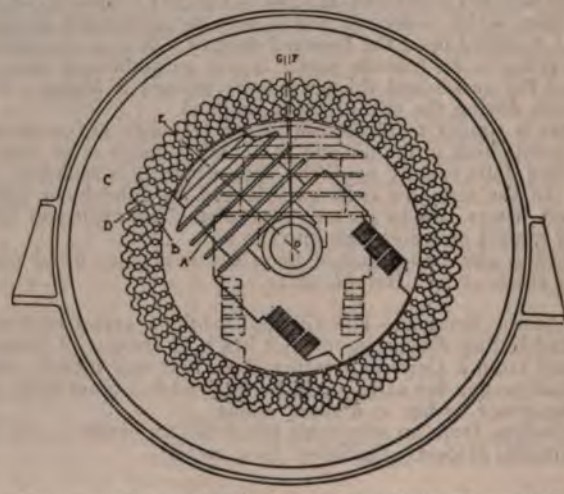


FIG. 1.—Diagram Illustrating the Operation of the Magnetic Reduction Gear.

From a brief study of this diagram it will be noted that the reduction ratio is equal to the number of secondary bars divided by the number of poles in the primary, while the number of stator teeth in each cage must be smaller than the number of secondary teeth by the number of poles of the primary. On a moment's consideration, it will be evident that if the number of teeth in the secondary is greater than that in the stator, the secondary will rotate against instead of with the driver. The torque on the secondary is not exerted by the primary, as in a magnetic slipping clutch, but is obtained by the pull of stator teeth on the secondary bars, while the primary merely furnishes the magnetic force. The secondary and stationary teeth form as many alinements as there are poles, so that if the driver is provided with more than two poles the ratio between the secondary and the stator teeth must be such as to provide the same number of alinements. Then, when the field poles are magnetized, the stator teeth will assume a position of greatest magnetic reluctance—that is, they will move into alinement with the stator teeth where the magnetic flux is greatest. Thereafter, the field cannot move without a corresponding movement of the secondary at an angular velocity determined by the reduction ratio.

This new magnetic gear is characteristic of a mechanical gear in that it has a fixed ratio of reduction for which it has been designed, and in this respect it is like a synchronous motor which when supplied with an alter-

nating current of fixed frequency will rotate at a corresponding speed; in the gear it is the speed of the driver, in place of the frequency, which determines the speed of the secondary driven element. It resembles the synchronous motor also in its ability to carry a certain maximum load before falling out of step with the driver. In designing, therefore, a suitable overload margin must be allowed above the normal operating load.

In order to corroborate the working of the principle of this gear, an experimental machine was built and to save time a stator and other parts that were on hand, were used in its construction. A photograph of this machine is reproduced herewith. It has a field with six poles. The stator consists of a single cage, which surrounds the secondary. The inner stator,

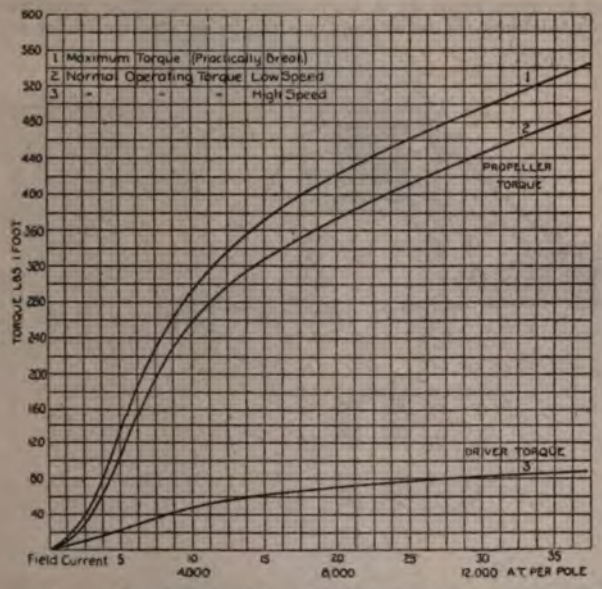


FIG. 2.—Chart Showing the Operation of the Experimental Machine.

indicated at *B* in Fig. 1, was omitted from this machine. There are 33 bars or teeth in the secondary and 27 on the stator—the reduction ratio, therefore, is 5.5 to 1. The operation of this gear is indicated in the accompanying chart, Fig. 2, in which the curve *1* represents the maximum loads the machine will carry with corresponding ampere turns per pole. It will be noted that the first part of the curve resembles the torque characteristic of a series motor while the latter part is much like a saturation curve and indicates that by increasing the pole and stator sections, the increased force beyond the bend of the curve would be made available for increasing the flux density at the bar gap and therefore adding materially to the torque of the secondary.

Based on the tests of the experimental machine, designs have been prepared for a full-sized unit, which is shown partly in section in Fig. 3, while Fig. 1 represents the arrangement of poles and teeth in the primary, secondary and stators. In the two drawings the same reference numerals are used for corresponding parts. This gear is arranged for a normal horsepower of 1500 and an overload margin of normal field of 60 per cent, reducing the speed from 3600 R. P. M. to 109, a reduction ratio of

33 to 1. This machine contains an additional stationary cage inserted between the field and secondary, the purpose of which is to increase the torque on the secondary. A torque practically double in value is produced on the secondary without increasing the core length. However, the field ampere turns must be increased to supply the necessary force for the added gap. A substantial cut in weight and an increased efficiency are the result.

The field has been especially developed to fill the requirements of high speed, balance and simple machining. It is circular in section and can be practically finished on the lathe and boring mill.

The field copper, wound directly in circular grooves turned in the core, comprises a bare strip insulated from the core by substantial insulating plates and between turns by a strip of fish paper. The insulating plates are of such thickness as to wedge the strip in the groove under tension so

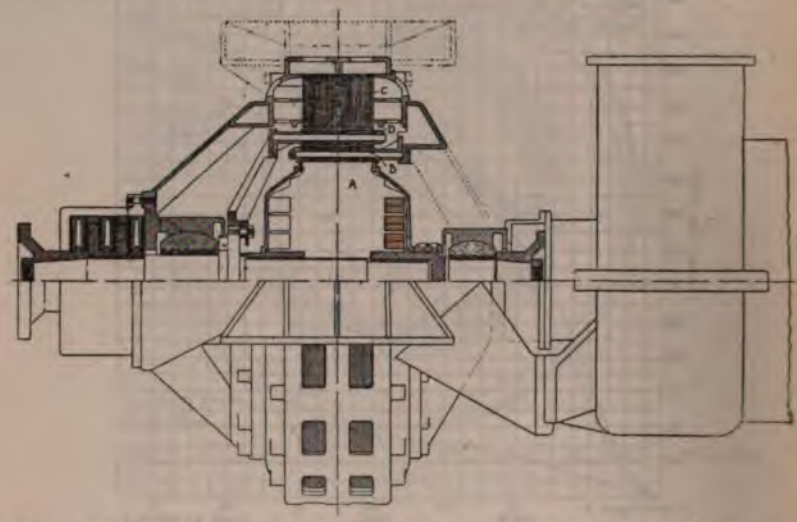


FIG. 3.—Design of a 1500 H. P. Gear Reducing from 3600 R. P. M. to 109.

that once wound and held by a bronze wire hand, the considerable centrifugal forces will be unable to displace it and thus cause unbalancing. The separating flanges serve to form a plurality of grooves to prevent a cumulative strain on the outer flange and to make possible a strip of reasonable width. Each groove contains two layers separated by an insulating plate and wound in opposite directions so as to bring all leads to the outside for easy connection.

Particular attention has been paid to the design of the cages. Their present arrangement combines the greatest possible section in the laminated bars with maximum strength of the non-magnetic supporting rods. A non-magnetic ring having axial holes drilled through, into which the rods are pressed, serves as the supporting member for the laminated bars each of which is forced between adjacent rods and insulated from them by a fiber tube on the rods 1/16-inch in thickness.

The rings, in turn, are screwed to the spider of the secondary and the stationary end bracket of the stator respectively. A narrow ring, insulated from the rods, ties each of the cages on the other side and thus makes the cages thoroughly rigid. Screwed to the spider of the secondary cage is the main or driven shaft which extends through the bore in the field so that

the field is partly supported by and rotates around the main shaft on bearings provided on either end. The two main bearings, one at the end of the main shaft and the other on a stub extension of the field sleeve, support the weight of the primary and secondary and thereby make the gear unit independent of the turbine and propeller-shaft bearings.

The main, and particularly the internal field bearings are oiled by pressure circulation, the oil being introduced into a circular groove in the center of the left-hand main bearing through a hole; from the groove into the center hole of the main shaft through several evenly spaced radial holes; out at the right end of the shaft and back through axial grooves in the bearing surfaces into a circular pocket of the spider and through holes

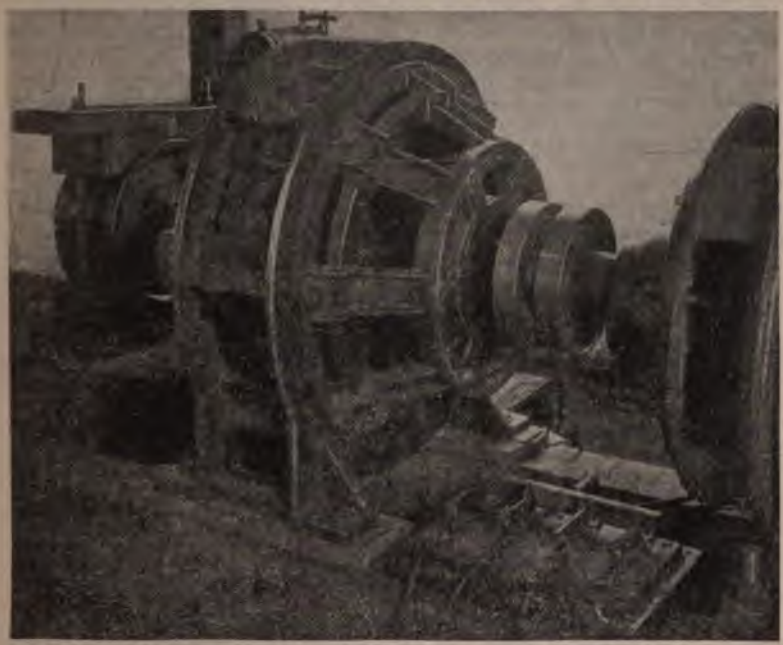


FIG. 4.—The Experimental Six-Pole Machine Which Gives a 5.5 to 1 Reduction.

back into the reservoir of the main bearing. In order to reduce the windage losses to a minimum the high velocity field member is entirely enclosed by aluminum plates on either side screwed to the field with a thin strip fastened to the plates and enclosing the outer circumference, so that externally the whole resembles a smooth drum and offers little resistance to rapid rotation.

The weight of this unit including the thrust bearing is estimated at 24,000 pounds, which, it will be noted, is less than 50 per cent the weight of a mechanical gear for a similar duty.

The losses are made up of the exciting loss, which in this design is normally 4.5 K. W. or about one-third of 1 per cent, the iron loss and the windage and friction losses and the total should not exceed 2 per cent, making the efficiency 98 per cent. The inventor and designer of this ingenious gear is A. H. Neuland of Bergenfield, N. J.—*Scientific American.*

GERMAN AEROPLANE ENGINES.—The Royal Agricultural Hall at Islington will not be the scene this year of the usual Christmas show of livestock and agricultural machinery. The hall is not, however, wholly dissevered from its normal functions, as a part of the building has been devoted by the authorities to a small, but most instructive exhibition of captured German aeroplanes and engines. The object of the exhibition is educational, and for the convenience of manufacturers and others interested in aero-engine design, several engines have been dissected, and sets of the component parts, sectioned where necessary to show the construction, have been mounted on large boards, alongside specimens of the engines to which they belong. There are altogether some dozens of captured engines either officially on view, or rendered visible, by the courtesy of the attendants, to those interested. The aeroplanes, which are five in number, occupy another part of the hall.

Perhaps the most striking fact in connection with the engines is that, with a solitary exception, they are all of the vertical 6-cylinder water-cooled type. German aero-engine design seems to have settled down along the lines of a straight-forward racing-car engine, not perhaps of extraordinary lightness for the power developed, but reliable, durable and above all, easy to manufacture in quantities with ordinary labor and shop equipment. The one exception to this type is a specimen of a 100-horsepower Oberursel engine which formerly adorned a Fokker fighting monoplane. This engine is of the 9-cylinder rotary air-cooled pattern, almost indistinguishable from the Gnome rotary engine, which is largely used by the British authorities. It has the typical Gnome pistons carrying automatic inlet-valves in their heads, and in other features the resemblance is exceedingly close.

Reverting to the standard 6-cylinder engines which really constitute the exhibition, these comprise the following types and sizes, namely, Mercédès 160-horsepower and 260-horsepower; Benz 160-horsepower and 220-horsepower; and Argus 120-horsepower and 200-horsepower. The Argus engines differ from the others in the fact that the cylinders are in pairs, one sheet-iron water-jacket enclosing two cylinders, but as these engines have not yet been sectioned it is not possible to see the details of the cylinder construction. One of them is equipped with an English carbureter and English magnetos, and we believe that many captured German engines have been found thus equipped. It is said to be the German practice to design their engines to take British accessories and so to be able to utilize valuable fittings stripped from our machines which have come to grief behind their lines.

The Argus engines are also noticeable by reason of the amount of labor spent on the elaborate finish of unimportant parts. This is certainly not a typical failing of German engines, for these as a rule display a common sense in the matter of finish, and of simplicity of detail, which our own manufacturers might emulate with advantage. On the whole, in so far as it can be inspected, the Argus engine does not apear to have any extraordinary merits, while in certain details, such as the use of loose cams secured by taper pins, the design is anything but commendable. On the whole, one probably would not be far wrong if he said that an equally good, or better, engine could be made for less money.

The real interest of the exhibition to designers of aero-engines lies in the remaining types, the Benz and Mercédès. These appear to represent the outcome of German experience as to what an aero-engine ought to be, at any rate for such work as long-distance bombing flights if not for more spectacular duties. The Gotha biplane carries two 260-horsepower Mercédès, the A. E. G. is similarly equipped, and the Rumpler biplane is fitted with a single engine of the same power and pattern. Benz engines of 220-horsepower are carried in the Aviatiks and the Agas. The Albatross two-seater carries a 160-horsepower Mercédès.

The Benz and Mercédès engines are, broadly speaking, of the same general pattern, each having six independent vertical water-cooled cylinders, with sheet-iron welded jackets, and both representing the final development of their racing-car prototypes. They weigh, we understand, about 3.75 pounds per normal brake horsepower at ground level, this figure comprising a complete engine, but without radiator, fuel, oil, or tanks. Of the two the Benz is slightly the lighter per brake horsepower, and from the manufacturing point of view the details of its design are generally preferable to those of the Mercédès. The 160-horsepower Mercédès aero-engine of pre-war days had cylinders in pairs, like those of the Argus, and the crankshaft was also of peculiar design, but these features have been abandoned in the modern engines.

Dealing with the points of difference, the Benz cylinders are of cast-iron with solid valve-seatings arranged vertically in the head, whereas the cylinders of the Mercédès are of steel with exhaust and induction ports screwed in at an angle. In both sizes of the Benz engine the inlet and exhaust valves are duplicated, and are operated by a crankshaft housed in the crankcasing. In the Mercédès engine a central overhead camshaft is adopted and duplicate valves are only used in the larger size. The casing of this camshaft appears a very costly piece of work, and the Benz design seems unquestionably better. The Benz pistons are of cast-iron with three rings at the top and no scraper ring. A perforated steel cone is riveted to the inside of the piston-head, the apex of the cone forming a small seating on the center of the gudgeon-pin. The function of this cone is probably to assist the lubrication of the pin, although the support it affords to the latter may be useful. The piston of the Mercédès is formed by screwing a steel head, carrying the gudgeon-pin bosses, into a cast-iron skirt. The design of the connecting-rods also shows considerable difference. The Benz rods are of parallel tubular form, involving only lathework of a simple kind, whereas the Mercédès rods are of the usual I-sections which gives greater trouble in machining.

Coming to the crankcase, in both engines the lower half of the case forms a support for the crankshaft so that the bearings and connecting rod-ends are very inaccessible when the engines are erected. This would appear to be an objectionable feature of both designs, unless it has been found that sufficient rigidity is not obtainable otherwise. There are no ball-bearings for the crankshaft of either engine, except for the thrust bearings. Oil cooling is arranged for on the Benz engine by a number of horizontal tubes passing transversely through the sump. A cowl on one side of the casing directs air into the tubes, and a similar cowl on the other side, facing backwards, assists the draft through them. In the same engine the crankshaft bearers are also cored transversely from side to side, so that the air-circulation may tend to cool the bearings, and through two of these ports the air is drawn to the carbureters. The induction-pipe system of the Benz compares favorably with that of its rival and the water circulation system seems pronouncedly superior. On the other hand the circulating pump of the Mercédès, with its shrouded impeller and volute discharge is of much superior design to that of the Benz.

The general impression left on the mind by an inspection of the captured engines, is that the Germans have carried the standardization of type infinitely further than we have, and therefore have placed themselves in a position to manufacture aero-engines with the maximum rapidity and cheapness. We have certainly captured many hundreds of German engines, and it is only reasonable to suppose that the collection at the Agricultural Hall is fairly representative of the bulk of those now used against our troops in Flanders and our civilian population at home. It is therefore a matter for remark that, except for the solitary Gnome engine, the Germans appear to have abandoned, or never to have used, the rotary type, the radial fixed type, the Vee type, the opposed type or the Broad Arrow

to speak of the numerous variants which each of these types s. They pin their faith, apparently, to a simple engine with the n number of parts, and devote their energies to increase of num- ther than to the development of types. That "it is lawful to learn he enemy" is a maxim as old as the art of war, and though our de- s might gather some useful lessons from the engines exhibited, and ly from the Benz engine, we think that the most important lesson of to be learnt by reflecting upon the contrast between the present ex- ion, and one which would be equally representative of current British tice.—*Engineering*, London, 14/12.

NAVY SHIP REPAIRS.—During the past year a greater volume of work has en performed under the Navy Department bureaus of steam engineering nd construction and repair than ever before. Every navy yard is working o the extent of its capacity and employing the force overtime. In addi- tion to that a large part of the repair work has been assigned to private plants under contract.

It has been found that the merchant ships, and especially the interned enemy vessels, taken over by the Navy Department, have required, almost without exception, a great deal of repair work, showing that in most cases the vessels were badly run down.

The destroyers and other craft that have been sent to foreign waters have given an admirable account of themselves in the freedom from disa- bility. Much repair work of a minor nature is done by the ships' forces, and more extensive repair work now is possible abroad by the ships' forces, the European station of the repair ships *Dixie* and *Melville*, the presence on of which are in charge of Commander Albert T. Church, who, while on duty at the Navy Department in the bureau of steam engineering, had a great deal to do with the equipment of those vessels.—*Washington Post*, 10/1.

FIVE-THOUSAND-TON REINFORCED CONCRETE SHIP BUILDING IN CALIFORNIA.—One of the most daring experiments in concrete ship-building is the project now under way at Redwood City, Cal., where the San Francisco

FIVE-THOUSAND-TON REINFORCED CONCRETE VESSEL UNDER CONSTRUCTION AT REDWOOD CITY, CAL.

Company is building a reinforced concrete freight steam- deadweight carrying capacity on a draft of 24 feet. The beam and 31 feet depth molded. She will h expansion reciprocating engine

1750 horsepower designed to give the vessel a speed of 10 knots at sea. Tank storage space for fuel oil will be provided sufficient for 30 days' steaming at her designed speed.

Some idea of the size and details of construction of the vessel can be gained from the photographs reproduced herewith, which show the progress of construction about December 1. The officers of the San Francisco Ship-Building Company, which is building the vessel, are: President,

INTERIOR VIEW AT BOW.

W. Leslie Comyn; vice-president, John Lawson, of Balfour, Guthrie and Co.; secretary, Kenneth MacDonald, of MacDonald and Kahn, and treasurer, George U. Hind. Messrs. Leslie Comyn and John Lawson, acting as an executive committee, exercise active management of the affairs of the company.—*Marine Engineering*, January.

AERONAUTICS

THE NAVAL ACADEMY AIRCRAFT FACTORY in a Pennsylvania city is, according to *The Army and Navy Journal*, completed and in operation. This plant, which covers three acres, the main building being 400 by 400 feet, was begun in August last. The structure was completed in November, the machinery installed, and the keel of the first flying boat laid within 90 days after construction started. The plant and its equipment cost the work necessary in the manufacture of seaplanes. Machinists are needed to operate the plant to its full capacity.

Almost every type of craftsman can help in some of the many kinds of work necessary in the manufacture of seaplanes. Machinists are needed to make and assemble the parts. Sheet-metal workers, acetylene welders, braziers, bicycle tube benders, coppersmiths, and wireworkers are all needed, and there is a demand for cabinet-makers, pattern-makers, boat builders and joiners. Women are needed to sew covers on the wings of the planes, and also to do some of the lighter woodwork.

The League Island Navy Yard, Philadelphia, is the place to apply for employment in the new naval aircraft factory.—*N. Y. Times*, 13/1.

HURRYING PLANS FOR ESTABLISHMENT BETWEEN FRANCE AND ENGLAND.—Plans for the establishment of an aerial postal service between France and England are rapidly approaching realization, and it is now believed that such a service, on a limited scale, will be put into effect without waiting for the end of the war. It will be used only for carrying official correspondence, especially that of the inter-allied committee sitting at Versailles. Reports and communications from the American representatives thus will catch the mail boats from England in about two days' better time than by the old methods.—*Evening Star*, 9/1.

U. S. NO AIR POWER IN SPRING.—Germany will have nothing to fear from the United States air-fighting forces during the coming spring, because the American aircraft program is "far behind" its schedule, according to Major William A. Bishop, winner of a Victoria cross, who addressed the Canadian Club at Montreal on Friday.

Major Bishop characterized as "unfortunate" the advertising which has been given the United States Government's aircraft program. He said that while France would find it impossible further to enlarge her airplane fighting forces during the coming half-year, Germany, knowing America's intentions, has greatly expanded her flying corps in an effort to gain supremacy in air warfare. Consequently, he declared, during the next few months Great Britain will have "to face the most terrible time she has yet faced, and especially from the point of view of war in the air."

America's assistance in maintaining allied air-fighting superiority "may be felt" by summer, but during the spring months Major Bishop said "the United States will not be a factor for the Germans to reckon with in the air."—*Washington Post*, 13/1.

REPORT OF THE U. S. NAVAL OBSERVATORY.—In his annual report to the Bureau of Navigation, Rear Admiral Howard, U. S. N., retired, superintendent of the Naval Observatory, refers to aviation instruments as follows:

"In conjunction with the station at Pensacola and other commands engaged in flying, the observatory has practically accepted as standard an altimeter (altitude aneroid barometer) and a clock. A compass for aircraft has been adopted and issued but is not proving entirely satisfactory, and further experiments are under way.

"One form of statoscope for dirigibles has been found satisfactory for certain purposes and will be issued to each dirigible when delivered. This is the Custer type. This instrument is non-luminous and does not indicate speed or amount of change of height. The observatory is assisting various inventors and makers of instruments to devise a statoscope that will answer all requirements.

"The observatory has on hand a small number of airplane cameras of acceptable design. These are not fixed in the car and their value will have to be determined in service. Other forms of cameras are under trial.—*Aviation*, January.

WHEREIN GERMAN CONSTRUCTORS SHOW GREAT SAGACITY.—Time and again it has been admitted in this column that the Teuton is a formidable aerial enemy. And somehow or another he has always been able to keep up with the combined production of Great Britain, France, Italy and Russia, not forgetting such aid as the Allies have received from the American constructors prior to our entering the world war. Just why this Teuton efficiency should remain manifest in the face of what appears to be an overwhelming handicap, is now beginning to be understood. The cardinal fact is that the Teuton, from the beginning, has considered the aeroplane in the light of a big motor fitted with a pair of wings. When the Allies built machines with 80-horsepower rotary engines at the beginning of the war, they found themselves competing with German planes fitted with

120-horsepower Mercédès engines. Needless to say, the allied machines were hopelessly outclassed; and on the side of the Germans the lack of numbers was made up by the superiority of the unit. Then the Allies went to the 100- and 120-horsepower plane, only to find that the Teuton had already gone to 160, 200 and 220 horsepower. Always have the allied planes been underpowered; and in order to increase climbing and speed characteristics the British and French constructors have had to shave off every ounce of cloth and wood possible to a point where the factor of safety is little more than a name. On the other hand, the Germans, working with a solidly-built machine, meet climbing and speed requirements merely by piling on more horsepower. We Americans have done well in developing the Liberty motor first, before our aeroplanes: for after all the Teuton is quite right: an aeroplane is nothing more than a powerful, reliable motor—with a pair of wings—*Scientific American*, 24/11.

MATERIALS NECESSARY FOR SINGLE AIRPLANE EXCLUSIVE OF ENGINE.—The following figures have been received from the Signal Corps, Aviation Section, of the materials necessary for a single airplane of the more simple type, and exclusive of all the materials necessary for the engine:

Nails		4326
Screws		3377
Steel stampings		921
Forgings		798
Turnbuckles		276
Veneer	square feet	57
Wire	feet	3262
Varnish	gallons	11
Dope	gallons	59
Aluminum	pounds	65
Rubber	feet	34
Linen	square yards	201
Spruce	feet	244
Pine	feet	58
Ash	feet	31
Hickory	feet	1½

—*Official Bulletin*, 29/12.

THE LANZIUS SPEED SCOUT.—The Lanzius speed scout is, unlike most present-day airplanes, a machine in which the incidence of the wings may be altered in flight at the will of the pilot.

Such an idea is not wholly new. Aeronautical investigators have predicted for years such a possibility. Indeed, Captain Duchêne in his celebrated work, "The Mechanics of the Airplane," dwelt with considerable force on this subject, and prophesied the adoption of the principle of variable incidence in future machines, to reduce or augment the drag which would give the pilot opportunity to check or increase his speed. He pointed out that existing difficulties "may be eventually overcome by the invention of the variable surface machine, which would permit a high speed to be maintained in normal flight while starting and landing could be accomplished at slow speed."

A machine based on this principle was produced in 1912 by Paul Schmitt, a Russian engineer living in France, and fully proved the correctness of the theory of variable incidence. This machine broke at the time several world's records for flights with five and more passengers. (A description of the Paul Schmitt airplane appeared in the October 1, 1917, issue of *Aviation and Aeronautical Engineering*.)

George Lanzius, a Hollander, who was working on this very theory at that time and built models of the same as early as 1911, continually improved his design until during the early part of 1917 he constructed a

machine incorporating these features, which was successfully demonstrated in flight.

The outstanding features of this machine are:

1. A cantilever frame, rigidly constructed to support the planes.
2. Planes pivoted in frame capable of being operated by pilot from 0 to 15 degrees.
3. Ailerons pivoted on plane tips under the angle of about 15 degrees, movable in opposite directions transverse to the planes.
4. A distinctive system of lateral control.

The machine is entirely built of steel, except for the wing frames. No wiring is used in the construction of the body, all members being joined by riveting. The cantilever frame is built up of stream-lined tubing and the wings are pivoted on this frame at the will of the pilot by means of a fixed worm-gear.

The wings are built up in the usual way of wooden frames and are covered with fabric. The drift wires do not run to the radiator frame but are fastened to the upper longerons of the body. The skeleton of the machine weighs complete 380 pounds.

The under carriage is built up of stream-lined V-struts and is equipped with resilient Ackerman wheels, which obviate the necessity for special shock absorbers. The control is of the stick type.

The characteristics of the Lanzius Speed Scout, as furnished by the manufacturer, are the following:

Span, upper plane	29 ft.
Span, lower plane	24 ft.
Chord, upper plane	4 ft.
Chord, lower plane	3 ft. 6 in.
Overall length	24 ft.
Overall height	8 ft. 6 in.
Weight, empty	1200 lb.
Weight, loaded	1800 lb.
Engine, Sturtevant	210 h. p.
High speed	140 m. p. h.
Low speed	40 m. p. h.
Fuel capacity	4 hrs.

—*Aviation*, January.

UNITED STATES AIRCRAFT PRODUCTION.—Howard E. Coffin, chairman of the Aircraft Production Board, has issued the following statement:

July 24, 1917, the date of the President's approval of the aircraft act, providing for the creation of the United States Military Air Service and providing $640,000,000 for its maintenance, marks the real beginning of aircraft history in this country.

About half of this amount appropriated was provided for the purchase of aircraft, of aircraft armament and equipment, and the remainder for the building up and maintenance of an air-service personnel greater than that of our entire standing army of a few months before.

At about this same time also our close contact with the allied air services was established through a strong military, technical, and industrial mission of more than 100 men sent to Europe. As a result of conference the policy of aircraft development mapped out for this country at that time was sevenfold.

This policy remains practically unchanged, and is as follows:

1. The United States to establish and maintain a great system of training stations, adequate both in ground schools and flying schools, to provide preliminary training for the personnel schedule.

Twenty-four great training stations were authorized under the bill to be built in accordance with the requirements scheduled in the air-service program. Nine grounds for the preliminary training of the flying personnel

in technical matters were planned at nationally known universities. Both lines of work have been completed in accordance with schedule almost to a day. More than half of these training stations are already in full operation, and the others under construction in strict accordance with the general plan.

2. To accomplish an international standardization in aircraft materials, in detail of design and types, and to achieve such coordination of effort as would concentrate the manufacturing facilities of the various allied countries upon the minimum number of types of those machines for which the producing equipment was best fitted.

International specifications for aircraft materials have been prepared under the direction of the board by a committee representing the allied countries. A complete coordination of manufacturing facilities and policies has been agreed upon between the allied powers. Standardization in types, designs, and materials will continue to be carried forward under international agreement already in effect.

3. To construct primary training machines of quality and quantity approved by the Joint Army and Navy Technical Committee.

The production of standardized training machines approved by the Joint Army and Navy Committee will be in excess of the needs of the program by January 20. The production of these machines has been behind schedule because of the necessity for supplying training engines from this country to meet Canada's considerable requirements and because of the difficulties of a sudden increase of a manufacturing industry inadequate to the task.

4. To provide, equip, and train personnel for flyers and mechanics in accordance with schedule recommended by the Joint Army and Navy Technical Committee

This program is progressing exactly on schedule. The training of both flyers and mechanics is provided for in this and in allied countries. Thousands of mechanics are being put into actual service with the allied forces. Trained men will be released as needed in the United States Air Service and their places kept filled with fresh material. Four of the northern flying schools near manufacturing centers have, in accordance with the training plans, been turned into mechanics' schools during the winter months. American flyers are in training in the United States and abroad and it is probale that the original program for pilots will be increased. The personnel for such increase is already available.

5. To provide raw and semi-finished materials and finished parts, including motors, to insure the consummation of the augmented allied aircraft-building programs.

This has been and is being done. All of the allied nations are in considerable degree dependent upon materials and parts shipped from the United States. It is vitally important that the American aircraft program be not permitted to interrupt this flow of materials to the Allies.

6. To provide for the equipment of the American forces in France for the period of January to June, 1918, in large part by purchase of fighting machines manufactured in allied countries, and to supply the machine tools and raw and semi-finished materials necessary to insure their production.

One of the first acts of the Aircraft Board after the passage of the appropriation bill in July was to authorize the placing by General Pershing of orders for several thousand fighting machines in allied countries. This action was taken to insure adequate equipment of the American forces prior to June, 1918, in case of expected delays in manufacture and shipment of American-made service planes. Many millions of dollars' worth of materials and machine tools have been shipped from this country to aid this production.

7. To provide completed service machines, including combat and bombing types, for American need after July 1, 1918, and for such shipment of the finished product overseas as tonnage might permit.

In accordance with the plans originally agreed upon with allied governments, it was deemed advisable to provide for advanced training overseas adjacent to the actual theater of military operations, but so energetic has been the work of the personnel division of the Signal Corps that the training facilities thus provided have been soon overcrowded, with resultant request that early arrangement for advanced training be made in America. To meet this change in program, delivery of advanced training planes will begin this month and within 90 days will have met requirements. The engines of foreign design for this advanced training schedule are already in quantity production in this country.

In discussing the accomplishments of the air service in the consummation of the army program, it will be well to point out the impossibility of certain proposals enthusiastically and persistently put forward by word of mouth and in the press. We have seen and heard much of the proposal of "100,000 airplanes" to be provided by the United States within the next year. In a country where one great industry produces a million and a half motor cars per year the fabrication of a hundred thousand planes might seem easy, but actual figures based upon three years of practical experience in the war show that there are now between 40 and 50 men of the auxiliary services required for each active machine at the front. If this same ratio should be adhered to in our service it would mean that some four million men would be required in our aeronautical department on foreign soil between our ports of debarkation and the fighting front.

Even though this number of men could be reduced by 50 per cent by increased efficiency and standardization, the number required is still staggering. Consider, also, the overseas transportation problem as related to material only and without reference to personnel and its maintenance. The transportation of finished planes, properly crated, with the necessary spares, accessories, and equipment is in itself a serious problem, in view of the situation in ship tonnage.

Again, the problem of proper housing behind the battle lines in Europe of such great numbers of planes as are carelessly discussed may well be left to sober thought.

Every policy in the development of the American Air Service has been decided upon recommendation of our technical advisers in daily consultation in allied countries, and under advice of an inter-allied staff of half a hundred experts assigned to our air service in the United States.

Every decision of the Aircraft Board has been based upon the military policies of the front. Daily cable communications with allied countries are maintained. The freest possible exchange of information, machine designs, and aircraft experts with foreign countries is in effect. Airplanes and engines of the very latest European development are going into production in the United States as quickly as, and perhaps more quickly and in greater quantities, than in allied countries. The feat of getting the 12-cylinder U. S. A. or so-called Liberty engine from the first scratch on paper in June to the beginning of production of quantity manufacturing tools in November is one never equalled even among the spectacular performances of the American motor-car business.

In June, from one to three weeks were required to deliver a properly authorized contract to a manufacturer after all details of the negotiation had been settled. To-day, a few hours only are needed. The slowness of the government departments in paying for the goods delivered has been a contractor's complaint of long standing. For 60 days past, in the disbursement of millions, no Signal Corps account properly presented has remained unpaid longer than one day after the delivery of the material.

Wherever facilities for manufacture have been offered which have seemed to promise reliable sources of supply in considerable quantity, investigation has been made by industrial experts to determine the value of these concerns in connection with the production program. Obviously, dependence for deliveries of the types of machines standardized by the

War Department could only be placed upon large concerns amply financed and controlled by organizations familiar with the processes of duplicate quantity production.

Since the passage of the aircraft bill in July, hundreds of concerns have asked for contracts to manufacture planes. Inasmuch as an organization of government accountants, inspectors, and production men must be maintained in each plant engaged upon the aircraft program, the complication, expense, and general impossibility of splitting up the work among a multitude of small contractors, each capable of producing but a few machines, should be clear. The government's best interests lay in safeguarding delivery in the most efficient way and at the lowest price, and required the building up of a nucleus of strong concerns to serve as the backbone of the aircraft program. Should the allied governments contemplate, as the war progresses, a further extension of American producing resources, there will be no difficulty in building up new sources of supply in every line of the work.

The policy pursued by the War and Navy departments, under direction of the board, has of necessity brought criticism from many quarters upon the part of small concerns or upon the part of those institutions unfitted because of location or of labor or other unsatisfactory conditions. Contracts have been requested upon the part of many concerns minus experience in the manufacture of such highly specialized goods and having not the slightest comprehension of the intricate ramifications involved in airplane and airplane-motor construction.

New sources of supply, flying fields, the experimental laboratory, and other activities under the direction of the board have been purposely located west of the Allegheny Mountains, in accordance with the stated policy of the military departments, to remove sources of war supply "200 miles from the seacoast," and to avoid the labor congestion which exists in all eastern industrial centers. The reasons for such a policy are too obvious to require comment.

Established plants of the motor car industry are being largely utilized in the program of aircraft-motor production, but automobile concerns are not being employed in airplane construction. In general, the statement may be made that not a single automobile factory is in any way involved in the plane-building industry. The reasons for utilizing the motor-building talent of the third largest of the world's industries permit no argument.

There has been established in Paris under the direction of the Aircraft Board a joint army and navy aircraft committee to coordinate the activities of army and navy in foreign territory and to form a direct channel of contact between the inter-allied aviation committee and the Aircraft Board in Washington.

The board has arranged with foreign governments for a free interchange of manufacturing rights and patents governing aircraft for the duration of the war. Endless business negotiations with foreign private interests have thus been avoided and delays have been eliminated and the expenditure of many millions of dollars prevented.—*Official Bulletin*, 11/1.

MERCHANT MARINE

SKINNER AND EDDY LAUNCH FIRST SHIP FOR UNITED STATES SHIPPING BOARD.—Before 15,000 spectators the steamship *Seattle*, the first ship to take the water under the United States Shipping Board's contracts, was launched at the plant of the Skinner and Eddy Ship-Building Corporation, Seattle, Wash., on Saturday, November 24, at 12.30 p. m. To commemorate the event the Shipping Board permitted this ship to be christened with the name of the city which had turned out their first product.

Under the Shipping Board contracts the *Seattle* received the official number 83, that many contracts having been awarded before the Skinner and Eddy Corporation received their six. As the *Seattle* is patterned after

the same design as the other 8800-ton cargo carriers turned out by that plant, everything was ripe for a speedy delivery of this ship, and within 77 working days after the keel was laid, Dave Rogers, the works manager, and his band of loyal workers had this ship in the water.

The sponsor for the *Seattle* was Mrs. Ernest Lister, wife of Governor Lister of Washington.

The *Seattle* is the eleventh ship turned out by the Skinner and Eddy yard in less than 20 months, number 10 being the *War Flame*, which was launched in 64 working days from the day the keel was laid, thus establishing a world's record for the construction of ships of the 8800-ton deadweight class.

At the same moment the *Seattle* was launched the Ames Ship-Building and Dry Dock Company, of Seattle, launched their first product, which is called the *War Brigade*.

Two more launchings are scheduled at the Skiner and Eddy plant before December 31, and during the next year it is expected that more than 14 ships will be sent down the ways at this plant.—*Marine Engineering*, January, 1918.

VESSEL LAUNCHED AT YARD BEGUN SEVEN MONTHS AGO.—A telegram to the Shipping Board told of the launching at Los Angeles of the first steel merchant ship contracted for by the Emergency Fleet Corporation. The vessel was one of eight of 8800 tons' capacity each ordered May 12 from S. L. Napthaly.

Turning out the vessel within seven months, when the yard in which it was built had to be constructed after the contract was awarded, was hailed by Shipping Board officials as demonstrating what American industry can do in an emergency.

One vessel contracted for by the Emergency Fleet Corporation already has been launched, but it came from the yard at Seattle, which has been in operation for many years.—*N. Y. Herald*, 17/12.

OUR SHIPBUILDING PROGRAM.—Writing recently in *Sea Power* Walter R. Alexander, attorney of the United States Shipping Board, states in part that "the following table is a summary of the complete ship-building program of the board:

	No.	Deadweight Tonnage
Ships which were requisitioned by order of August 3, 1917.	403	2,800,000
Ships for which contracts had been let September 22, 1917, under program for new ship construction	636	3,124,700
Program contemplated under additional authorization of Act of October 6, 1917	600	5,000,000
	1,639	19,924,700

All of the vessels represented in the above program will be suitable for overseas commerce. As a basis for comparison it may be stated that at the commencement of the present world war the United States had less than 1,000,000 tons deadweight of ships registered for foreign trade, and has at the present time about 4,571,000 tons deadweight registered therefor."—*Scientific American*, 29/12.

MAY TAKE SAILING SHIPS.—Requisitioning of all American sailing vessels was forecast to-day when the Shipping Board requested the Department of Commerce to report the location of such vessels. Secretary Redfield replied that 175 sailing vessels, with a cargo-carrying capacity of 425,000 tons, now are within or adjacent to American territorial waters.

There are nearly 500 sailing vessels of 1000 tons or larger flying the American flag, and it is being urged that in this time of stress, when the liberty of the world depends on shipment of food and supplies to Europe,

the vessels should be taken from private business and put into the public service.

Of the 175 vessels which could be made immediately available, 76 are in ballast, 90 are loaded and 9 are undergoing repairs which will be finished soon. The other vessels are scattered.—*N. Y. Times*, 4/1.

NAVAL CREWS FOR MERCHANT VESSELS.—If it were some new theory advanced in favor of a special interest the question of manning merchant vessels with naval crews or with a definite proportion of naval crews might be open to further inquiry and discussion. But behind this proposition is a solid body of practice established during eight months' experience of war and demonstrating that the conditions on board chartered commercial vessels have been detrimental to the efficiency so vitally demanded.

No reflection on the skill and patriotism of merchant officers enters, nor does any proof exist that naval officers and crews embarked have in such circumstances assumed to exercise any undue authority, but clashes have been frequent between the two elements and transportation has suffered. War is war, and the organization of merchant vessels, however well suited to ordinary voyages in peace, does not lend itself either in kind or degree to the new and strange requirements of hostilities. Then, too, naval discipline varies in many essentials from that enforced in the mercantile marine, and this alone must result, and has resulted, in the friction and danger created.

Relief is promised for these anomalous conditions. The sub-committee of the House Naval Committee inquiring into the navy's conduct of the war will, it is reported, recommend legislation for manning merchant vessels with enlisted men of the navy. The scope of this intended measure has not been revealed, but it is a departure in a right direction and it is hoped that Congress will accept it, a proper recognition of the rights of merchant officers and a due regard for their susceptibilities being observed.—*N. Y. Herald*, 11/1.

FORTY-ONE SHIPS BY END OF FEBRUARY.—Forty-one ships of approximately 300,000 tonnage will be delivered to the Emergency Fleet Corporation from their ways by the end of February. This announcement was made to-night by E. N. Hurley, chairman of the United States Shipping Board.

These ships were requisitioned from private owners by the government for war purposes. Eighteen of them will be completed during January, with a total deadweight tonnage of 145,091. Twenty-three will be finished by the end of February, with total deadweight tonnage of 182,061.

These ships for the most part are cargo vessels and tankers.

Their place of delivery, builders and type follow:

Seattle—Seattle Ship-Building Company, three cargo ships; Skinner and Eddy, one tanker, one cargo; Ames, two cargo.

Portland, Ore.—Williamette, three cargo; Albina, two cargo.

Oakland, Cal.—Moore and Scott, three cargo.

Newport News—Newport News Ship-Building and Ddrydock Company, one cargo, one tanker.

Quincy, Mass.—Bethlehem—Fore River plant, two cargoes.

San Francisco—Bethlehem, one cargo, three tankers.

Columbia River or Puget Sound—Duthie, four cargoes; Columbia, one cargo.

Baltimore—Baltimore, two cargoes.

Philadelphia—Cramps, one passenger and cargo.

Port of New York—Cramps, two cargoes and passenger.

Gloucester, N. J.—Pennsylvania, two tankers.

Delaware River—Chester, one cargo, one tanker.

Port Richmond, N. Y.—Staten Island, one cargo.

Camden, N. J.—New York, one collier.

Long Beach, California—Craig, one cargo.

Wilmington, Del.—Bethlehem-Harlan plant, one cargo.

—*Baltimore American*, 14/1.

PUTS SHIP OUTPUT AT 5,000,000 TONS.—To the statement of H. L. Ferguson before the Senate Commerce Committee that only 3,000,000 tons of shipping would be constructed in American yards this year, Edward N. Hurley, chairman of the Shipping Board, replied to-day with the assertion that the total output would be approximately 5,000,000 tons. In support of this a Lloyd's report was quoted, which put the capacity of American yards at from 4,500,000 tons to the 5,000,000 estimate of Mr. Hurley. Lloyd's, it was stated, did not take into consideration the plans for speeding up work in the yards.

Facts concerning the activities in shipyards, where government contracts are being handled, were presented. There are now 118 yards, which are 95 per cent completed, and in them are 716 ways, 416 for steel ships, and 300 for wooden ships. On December 22 there were 171,274 men employed in shipyards, as compared with 105,497 in October. It has been estimated that at least two wooden ships will be constructed on each way during the year and three to four steel ships. Plans are making to provide sufficient ways for all new construction possible with the materials obtainable.

Ship-builders are being urged to put on three shifts a day, and in some this program has been adopted. A campaign has been started to obtain sufficient men for the three shifts. At least 382,000 more workers will be required.

Charges that "Steel Trust" officials blocked a plan by which the government was to get steel for ship plates at one-third less than it is paying were made before the Senate committee to-day by L. P. Featherstone, president of the Texas Steel Company.

Featherstone proposed to sell to the government ore lands in Texas and coal properties in Alabama and erect a steel plant at Beaumont to make steel ship plates at about $45 a ton, as against $65 that other steel companies are charging the government. This plan, he said, was referred by the Shipping Board to the Council of National Defence and theince to a sub-committee on which were C. M. Schwab and other officials of large companies.

"They turned me down on the excuse that the government was not prepared to go into business for itself," said Featherstone. "I might not have expected anything different from the crowd of dollar-a-year men who were beneficiaries of high prices. There has not been an independent concern in the United States large enough to permit the government to be free from the men who control the steel output since Roosevelt surrendered to Frick and Gary and allowed them to take over the Tennessee Coal and Iron Company."—*N. Y. Times*, 11/1.

MERCHANT CAPTAINS WARNED.—Complaints that American merchant ship captains have not cooperated with commanders of convoys and with naval gun-crew commanders caused the Department of Commerce to issue instructions to-day to merchant officers to follow the directions of their naval associates in every instance where they are prompted by military necessity. Disobedience of the instructions, it is pointed out, will cause the withdrawal of merchant officers' licenses.

The instructions make clear, however, that in matters relating solely to navigation and to the discipline of crews the authority of merchant captains will be upheld.—*Baltimore Sun*, 20/12.

U. S. MERCHANT-MARINE PERSONNEL.—The great work for which the Shipping Board's recruiting service was created, the building up of an all-American personnel of officers and men for the new ships, has been going on since last June. It began with the training of officers at free schools in navigation and marine engineering at various ports on the Atlantic and Pacific coasts and the Great Lakes. At these schools about 600 men a term are being trained, the engineering term being one month, and the navigation

term about six weeks. On graduating, these students are sent to sea as reserve officers of the merchant marine, for further training, preliminary to their being licensed as mates or engineers.

By this method enough American officers have been trained in the past six months to keep pace with the demand arising from our increased merchant tonnage, not less than 3000 licenses having been issued in that time by the Steamboat-Inspection Service, which examines all candidates for licenses, under exacting requirements as to their experience and fitness. No man without proper sea experience can be licensed.

The supply of man-power from which these officers were drawn has by no means been exhausted. Our training schools for officers to-day are going on with their work with well-filled classes. We have navigation schools at Rockland and Portland, Me., at Cambridge, Mass., New York, Philadelphia, Baltimore, Newport News, and Norfolk, Jacksonville, Mobile, New Orleans and Galveston, San Diego, Los Angeles, San Francisco, Portland, Ore., and Tacoma and Bellingham, Wash.

We have free engineering schools at the Massachusetts Institute of Technology, Cambridge, the Stevens Institute, Hoboken, at Philadelphia, at Johns Hopkins University, Baltimore, at the Case School of Applied Science Cleveland, at Washington University, Seattle, and at Tulane University, New Orleans.

I submit that these facts are significant of our strength as a seagoing nation and of the virility of our new merchant marine.

The recruiting service of the Shipping Board is now engaged in an extension of its work to embrace the training of crews for our new ships, including seamen, firemen, oilers, water-tenders, cooks and stewards, in accordance with authority received from the board on December 7. On December 12 announcement of the board's training plan was made at Washington.

American seamen came forward at once to enter the new training service, not less than 500 applying at my office in the Boston Custom House in the first five days after the plan was announced, for service in what I may term the rank and file of the new merchant crews. The applications came from all parts of the country and from Americans in all walks of life. A considerable number of applicants gave evidence of education, and some stated they were college graduates. All counted it an honor to serve their country in its commercial fleets.

Our plan for preparing these men for service at sea is based on the best experience of our own and other maritime nations. It calls for the use of a squadron of training ships to take men to sea for intensive drilling in the duties of the mercantile mariner.

One ship already is in commission, another is being prepared for service, and steps are being taken to secure a third, for service in this squadron, which will have a home station at Boston. It is planned to extend this training service, if circumstances permit, to the Gulf and the Pacific Coast, with a training ship to be based on a port in each of these sections.

It is expected that six weeks of intensive drill at sea will fit a man of ordinary intelligence for duties as seaman, and a month for those of fireman. These are the two arms of the service in which there is the greatest need of capable men.

Careful thought was given to employing the most effective method of training, and it was decided that assigning a trained man of long experience to a squad of 10 men, and making him responsible for their satisfactory advancement, was the best method to pursue.

Students of the subject will recognize in this system a principle long advocated by friends of a strong national merchant marine, and successfully employed in the work of various states in training boys for the merchant service by the use of school ships, notably Massachusetts, New York and Pennsylvania. These school ships necessarily have had a limited output of graduates, and their system of training, though thorough, has been slow.

The Shipping Board's training ships expand the workable idea they represent, to meet a war emergency, and to lay the foundation of a greater merchant marine when peace returns.

None but citizens may enter the Shipping Board's training service, and the enthusiasm with which the actual work of training is being carried out seems to me to assure all-American crews for our new ships, such as have so long been the dream of all true friends of our merchant marine.—*Shipping*, 5/1.

SUGGESTIONS FOR SAFETY.—The Shipping Board has issued a booklet giving practical suggestions for traversing the war zone. The regulations cover the berthing of passengers, plugging shell holes, fastening bulkheads, tunnels, doors and other vital parts, and also the distributing of seamen's discharge books upon entering the danger zone. Passengers and seamen are warned to keep themselves warmly clothed and ready for any emergency. Copies of this publication can be had from the Government Printing Office, Washington, D. C.—*Marine Journal*, 29/12.

SHIPYARD EFFICIENCY.—In order to increase the shipyard worker's efficiency, men from the various steel ship-building plants are to undergo special training. They will be selected from different yards and undergo a period of six weeks' training. At the end of that time they will return to their respective yards and impart their knowledge to those engaged in construction work. The first class to undergo training will number about 200. The school will be held at the plant of the Newport News Ship-Building and Dry Dock Company, at Newport News, Va., which affords special facilities for training of this character. A reference to the *Nautical Gazette* of September 28, 1916, reveals the following interest displayed by that company for its operatives:

"Co-operating with the public schools and the Y. M. C. A., the company (Newport News Ship-Building and Dry Dock Company) has caused to be instituted in those buildings extensive evening school courses. All boys employed by this company are urged to attend one or more of these classes, due credit being given on the employment record for such attendance, and liberal rewards made for excellence of record. The courses embrace arithmetic, commercial arithmetic, algebra, geometry, physics, shop-sketching, plan-reading, mechanical drawing and a graded course in English. Work is also offered in English for foreigners and in elementary branches for colored boys and men."

With the foregoing as a basis one may expect good results from the new system of training.—*Nautical Gazette*, 15/11.

PERSONNEL

RETIRED NAVY OFFICERS RECALLED TO SERVICE.—The war has called back into active service nearly 500 retired officers of the navy, and 138 former officers who resigned in past years to enter civil life are now serving in the Fleet Naval Reserve.

There are 22 retired rear admirals, 18 commodores, and 34 captains on active duty, including many who have held important commands in the Spanish-American War, on service in Mexican waters, and in other operations of the navy. Seventy-nine retired commanders are in active service, 36 lieutenant commanders, 30 lieutenants, 25 lieutenants (junior grade), 28 ensigns, and many others in various other grades. One retired surgeon general, 3 medical inspectors, 6 medical directors, 8 surgeons, 5 passed assistant surgeons, and 4 assistant surgeons are on active service.

Former Secretary of the Navy Truman H. Newberry has been commissioned lieutenant commander, the highest temporary rank that could be given him under the law, and is now in command of the Neval Reserve Force of the Third District, New York.—*Official Bulletin*, 17/12.

MEN FOR FLYING CORPS.—Eight thousand men with special technical training are needed by the navy for the ground personnel of the Naval Flying Corps. Secretary Daniels has authorized the enlistment of this number, and recruiting officers have been directed to begin a drive to get the men.

There is an immediate need for mechanicians for naval aviation for the ratings of machinists' mates, carpenters' mates, quartermasters, coppersmiths and blacksmiths. These men will not be enlisted for pilot's duties, but will receive special training in the building, handling, repairing and overhauling of the navy's aircraft.—*N. Y. Herald*, 12/1.

THIRTY APPOINTED AS ASSISTANT CIVIL ENGINEERS IN THE NAVY.—Thirty candidates who passed a recent examination have been appointed to fill 10 vacancies and 20 temporary positions in the grade of assistant civil engineer, United States Navy. The strength of the Corps of Civil Engineers, formerly composed of 30 civil engineers and 36 assistant civil engineers, is now increased to 96.

The 233 candidates who took the preliminary examination represented 65 colleges, universities, and technical schools, coming from 37 states and from England, Canada, Russia, France, Switzerland, and the territory of Hawaii. Of this number, 80 passed the preliminary examination and were authorized to appear at Washington, D. C., for the final. Out of the 73 reporting, 23 failed to qualify physically, leaving 50 to compete in the written examination. Thirty of these, representing 19 colleges and coming from 12 states, qualified in this final test, and have been appointed assistant civil engineers with the rank of lieutenant (junior grade).—*Official Bulletin*, 14/1.

SIXTY NEW OFFICERS OF ENGINEERING CORP.—Some 60 new officers of the naval engineering corps arrived at the Naval Academy, January 8, for a month's intensive training along that and other military lines.

Admiral Eberle, Superintendent of the Naval Academy, who is their chief during the stay of these young officers there, made a short address to them upon their arrival.

Admiral Eberle outlined the best methods of acquiring instruction while the corps is in training at the Naval Academy, where they have come to receive this instruction, and gave the young officers some good, wholesome advice.

The new engineer corps, numbering 60 officers, is quartered in Section B, Temporary Quarters at the Naval Academy.—*Evening Gazette*, 11/1.

NEW NAVAL OFFICERS.—After not quite 15 weeks' intensive training in the practical side of naval officering, between 100 and 130 young junior lieutenants, who a few months ago left their civil vocations at the call of the government, were detached from the Naval Academy. The young officers, who come from all walks of life and almost all professions and trades, were sent immediately to ships and shore stations for immediate duty.—*Baltimore American*, 10/1.

WAR SPEEDS GRADUATION OF MIDSHIPMEN.—The present "first" class of midshipmen is to be graduated on June 6, 1918, from the Naval Academy, according to information received at Annapolis, December 29.

Ordinarily this class would not have completed its course until June, 1919, but it was advanced a year in the "speeding-up" program to provide officers for the service made necessary by expansion due to the war.

A class was graduated June 18 last and another last February.—*Washington Star*, 30/12.

NAVY OFFICERS WARNED.—In order that domestic affairs may not interfere with the attention of naval officers to their official duties, Secretary Daniels has forbidden officers establishing their families in the immediate vicinity of the ships on which they are serving. The prohibition is carried in a general order which says:

"The attention of all officers of the navy and marine corps is directed to the fact that, due to the very large number of vessels to be commissioned in the near future, and to the limited number of officers available, it becomes absolutely necessary for every officer to devote his entire time and attention to the preparation of every element of the fleet for meeting the enemy.

"In order that there may be no distraction from this duty, neither officers nor men should attempt to have their families in the immediate vicinity of the vessels upon which they are serving, particularly in the vicinity of fleet bases, and the department looks with decided disapproval upon such procedure."—*N. Y. Times*, 17/1.

INCREASE IN NUMBER OF MIDSHIPMEN AT ANNAPOLIS IS URGED.—Mr. Daniels, Secretary of the Navy, recommended to-day that Congress increase the number of midshipmen which each senator and representative may appoint to the Naval Academy from three to five. Special emphasis was placed on the need for more naval officers in a letter sent by Secretary Daniels to Speaker Clark. He said that these officers ought to be trained in Annapolis, "the school which Congress has provided and employed for training line officers."

In addition to allowing five appointments to each senator, representative and delegate in Congress, the bill submitted by Secretary Daniels provides for the appointment of 100 enlisted men to the Academy.—*N. Y. Herald*, 12/1.

MARINE CORPS INCREASE.—The latest unofficial estimates are that a marine corps of 75,000 men will be required within the next year to meet all naval needs and to maintain a division of marines in France. Naturally, the corps is waiting anxiously for Major General George Barnett to appear before the naval committees of Congress and explain just how many men are needed to meet the demands on the corps in all directions.

If the navy is given the increase of 78,000 men recommended by the Bureau of Navigation and if the marine corps is increased from its present 30,000 by only one-fifth of the navy increase, that would give a total marine corps of 45,600.

The marines aspire to increase their representation in France from a brigade to a complete division, including artillery and auxiliary troops. A corps of 45,600 would not be large enough to enable them to do this, if the needs of the navy for the services of marines also are to be met.

In view of the necessity of providing replacement troops for the marine forces that may be sent to and kept in France, it is a conservative estimate that a corps of some 75,000 men would be required to maintain a division in France and for the various organizations and detachments to meet the demands of the navy for advance-base service, yards, stations, ships, etc.

In view of the high opinion of the marine corps held in Congress, it will not be surprising if authority is given at this session for increase of the corps to 75,000 men. An increase especially is necessary, aside from the immediate needs, in order that the excellent training facilities of the corps, which have practically completed the work of bringing the present force to a high state of efficiency and are not now being used to capacity, may be further utilized.—*Washington Post*, 6/1.

NAVY LIKELY TO MAN ALL TRADE VESSELS.—The manning by the navy of all vessels belonging to the merchant marine of the United States, whether such vessels are used as transports, supply ships or cargo carriers, seems likely as a result of a conference held to-day at the Navy Department between Mr. Daniels, Secretary of the Navy, Edward N. Hurley, Chairman of the Shipping Board, and Andrew Furuseth, representing the Seamen's Union.

Little has been written, although much is known of conditions prevailing on virtually all of the ships manned by members of the Seamen's Union,

conditions which not only have retarded the operation of such vessels and delayed them in transit, but conduct by men of the crews which has seriously jeopardized the property of the United States and the lives of all on board such vessels.

The Navy Department has refused positively to operate vessels which are not manned exclusively by enlisted men. The Shipping Board is known to favor the manning of all vessels which are not under the control of the Navy Department with members of the Naval Reserve, but it is prevented from carrying this arrangement into effect by an agreement made several months ago with the Seamen's Union, which does not expire until next August.—*N. Y. Herald*, 28/12.

LESSONS OF THE WAR

THE APOTHEOSIS OF THE DESTROYER.—Only a few months before the war naval opinion was disposed to anticipate the early disappearance of the torpedo-boat destroyer. It was already looked upon as a nondescript type, which had outlived its usefulness, and was fated soon to be superseded by the swift submarine, just as the destroyer itself had superseded the torpedo-gunboat 20 years before. But this view has not been borne out by the experience of the war. On the contrary, for all-round utility the destroyer to-day probably holds the palm, and it is no secret that every one of the belligerent sea powers is turning out vessels of this type as rapidly as possible. Among the German boats reported as having been in action during the present year were several bearing numbers which, in the normal course of events, would have belonged to destroyers built under the 1919-1920 program, and there is other evidence to show that between 80 and 100 new boats have been added to the German fleet since 1914. So far as this country is concerned, statements made in Parliament by Admiralty representatives leave no doubt that destroyer construction has occupied, and still occupies, a leading place in our naval shipbuilding policy, and it will not have escaped attention that many new destroyer names, such as the *Mary Rose* and *Strongbow*—lost in the recent convoy attack in the North Sea—have been mentioned in the official communiqués. The Jutland battle dispatches also specified several destroyers which did not appear in the pre-war navy lists. The truth is that the destroyer bridges an important gap in the modern naval organization. It comes between the submarine and the light cruiser, and it has certain qualities which neither of these possess at present, nor are likely to possess in the near future. Compared with the submarine, it has the advantage of superior mobility, and, in certain circumstances, of greater offensive power. From the last-named quality arises, we believe, the fact that the number of submarines sunk by destroyer attack is considerably in excess of the number of destroyers lost through submarine attack. To heavier surface ships, such as battleships and cruisers, the submarine may be a more formidable menace than the destroyer, but that it is remains yet to be proved. Even so, however, the submarine menace itself has given the destroyer a new lease of life, for the heavy ships now rely mainly on the destroyer to defend them from underwater attack.

Taking the characteristics of the destroyers built by the principal naval powers immediately before the war, we find a certain similarity in the main features, which suggests the evolution of a universal design. There were notable exceptions, it is true, but the tendency on the whole was towards a uniform standard. The displacement averaged 1000 tons, the speed ranged from 29½ to 35 knots, and the armament generally included several guns of at least 4-inch caliber, besides torpedo tubes. In the minor details there was more divergence, especially in armament. The British practice was to strengthen artillery power, while the Germans appear to have laid more stress on the torpedo, and their latest pre-war boats carried six tubes, but only a couple of low-velocity guns. In the

United States an effort was made to combine both offensive elements in the highest degree, and the 1914 destroyers carry no less than 12 torpedo tubes, in addition to four 4-inch guns. The French boats of the *Bouclier* class, launched in 1910 and onward, represented something of a compromise both in displacement and armament, for the units of this class vary from 690 to 900 tons, and are equipped with two 4-inch and four 9-pounder guns, and four tubes. Some of them attained what were then regarded as extremely high speeds, the nameship of the class having made 35.4 knots on the measured mile. Italian constructors, following, as usual, a line of their own, built several remarkable vessels, which seemed to foreshadow the fusion of the destroyer with the light cruiser. From the *Indomito* class of 1911 they proceeded to the *Carlo Mirabello* group, jumping from 700 tons to 1500, but reducing the speed from 35 to 32 knots. All the later Italian boats were heavily armed, mounting at least one 4.7-inch gun, though the number of tubes rarely exceeded three. Russia had adopted the *Novik* as the model for all her new destroyers, and had 36 boats of this class under construction on the outbreak of war. The *Novik* was 338 feet in length, displaced 1260 tons, and with engines of 40,200 horsepower had developed the remarkable speed of 37.3 knots. Her armament consisted of four 4.1-inch Q. F., several lighter guns, and six torpedo tubes mounted in pairs. Judging by these details she was one of the most formidable destroyers in existence, and her large capacity for oil fuel gave her a very wide radius of action. Among the lesser powers Chili was foremost in developing the destroyer. In 1910 she ordered from British yards a group of boats which, although classified as destroyers, were in many respects more akin to light cruisers. They displaced 1430 tons, and had machinery intended to realize 32 knots. The armament consisted of six 4-inch guns, with three torpedo tubes. Both the exceptionally high freeboard and the roomy accommodation for the crew made them very seaworthy and habitable vessels, while the fuel capacity of 500 tons was sufficient for a cruise of several thousand miles. Thus in armament, sea-keeping qualities, and radius they were equal, if not superior, to the average third-class cruiser, and had the additional advantage of extremely high speed. Turbine machinery and oil fuel are the factors mainly responsible for the striking development of the destroyer type in recent years. Great displacement is no longer essential to the attainment of high velocity, nor does the maintenance of maximum speed entail any particular hardship on the firemen or engineers. The fact that displacement has increased is principally due to the desire to mount a more powerful armament and to obtain better nautical qualities. But it has been shown that all these desiderata may be comprised in a vessel of not more than 1000 tons, and when the records of the war become available, we shall probably find that a vast amount of useful work was performed by the destroyer of moderate tonnage. Vessels of this type have been largely used for patrol and convoy duty, in place of the more costly but equally vulnerable light cruiser, and they are simply invaluable for anti-submarine work. According to the American Naval Secretary, "they are the one thing that a submarine fears."

Without a detailed knowledge of all that has occurred at sea during the war, it is impossible to forecast with any certainty the lines of future naval development. But, with this reservation, we venture to assert that the destroyer is assured of a prominent place in the category of naval weapons for a good many years yet, more especially as, for the time being at least, it is the most effective antidote to the submarine. That underwater craft will steadily grow in efficiency is not to be doubted, but years must elapse before they can compete with the destroyer in speed and handiness, and until that happens the latter will retain its high tactical value both for ordinary patrol duty and as a means of protection against the submarine. The battle of Jutland showed, moreover, that the destroyer is still to be reckoned with as a potent weapon against the capital ship.

Throughout that engagement no ship on either side fell a victim to attack by submarines, but several German ships were sunk by destroyers. As the satellite of a battle squadron the destroyer is able to perform a variety of useful services. It can blind and confuse the enemy's gunners by throwing a pall of smoke over the target, it is ready at all times to beat off torpedo attack either from below or on the surface, or itself to dash in against the enemy's swiftly-moving line and assail him with torpedoes. The submarine as yet can do none of these things. Although exact figures are not available, we believe the modern destroyer costs no more than the modern submarine, but whereas the military value of the latter is very restricted, that of the destroyer is almost unlimited. As we have observed, therefore, the destroyer, so far from having outlived its usefulness, has established itself more firmly than ever as an indispensable unit of the naval organization, and seems certain to be perpetuated as a distinct type for a long time to come.—*Engineer*, 7/12.

MISCELLANEOUS NOTES

THREE LOST ON NAVY TUG.—Three men were fatally and a fourth seriously injured in the fuel-oil fire on a navy tug at an Atlantic port yesterday, the Navy Department announced tonight.—*Baltimore Sun*, 16/12.

CUSTOMS ON PARCELS TO NAVAL FORCE IN ENGLAND.—The British Board of Customs announces that gift parcels containing dutiable goods may be delivered free of duty when intended for officers and men of the United States Navy in the United Kingdom, provided they are for delivery on board ship in which addressee is serving. When intended for members of the United States Army in the United Kingdom, parcels should be addressed to regimental address of recipient; when intended for soldiers of American nationality in British or Canadian armies or for American medical officers serving in British military or base hospitals, parcels should be addressed in care of Committee for American Soldiers and Sailors of the American Red Cross, 154 New Bond Street, London, which committee will verify right of addressee to duty-free concession and arrange for delivery of parcels. Dutiable goods must be specifically described as tobacco, cigarettes, chocolate, etc. The foregoing relates solely to dutiable goods imported by parcels post.—*Shipping*, 22/12.

THE DREADNOUGHT "TEXAS" WINS GUNNERY LAURELS.—The dreadnought *Texas* established the highest record for gunnery practice last year, the Navy Department announced to-day, and will receive the Knox trophy, which is awarded annually to battleships scoring the highest number of points.

Captain Victor Blue, who commanded the *Texas* during the practice maneuvers, has been ordered to Boston to receive the trophy from the Sons of the American Revolution.—*N. Y. Herald*, 15/1.

UNITED STATES TO CONTROL MANILA HEMP.—The government has announced its intention to take action looking to the control of the purchase and distribution of manila hemp. It is expected in the next few days details of the plan will be announced.—*Official Bulletin*, 10/1.

SIX SEAMEN KILLED; THREE HURT.—Six men were killed and three injured on the U. S. S. *Michigan* when the ship was caught in a heavy gale at sea, it was officially announced to-day.

The men were killed and injured by the falling of a cage mast, the first accident of its kind in the navy.—*Evening Star*, 7/1.

WINTER CLOTHES.—Paymaster General McGowan furnished to the committee samples of winter clothing and boots and gave positive assurance that there was an ample supply of these articles on hand. Surgeon General Braisted told the committee that the average health conditions in the navy were better than the average health of men in civil life.—*Official Bulletin*, 12/1.

MEDALS OF HONOR.—Urge your member of Congress to vote favorably upon a resolution permitting American soldiers and sailors to receive from the allied governments medals of honor awarded them for their brave and splendid work in this war.

At least a dozen such medals awarded by the British Government to officers and seamen of the naval forces operating under Vice Admiral Sims are now being held by the State Department. But the Constitution of the United States forbids their accepting any medal or other recognition of service from a foreign government, except upon the express consent of Congress.

Obviously this is a time when Congress should grant such a permission. It does not, as a matter of international courtesy, harmonize with the relationship now existing between this government and the allied governments to refuse them the right to make appropriate acknowledgment of American services in the common cause.

The Navy League believes also that the government should make known the names and the deeds of these men cited for bravery by our Allies. As history is but the shadow of great men, patriotism is largely a reflection from the deeds of brave men. We need this inspiration of the acts of these men to give us the will to win.—*Sea Power*, January, 1918.

NAVY OIL BILL IN.—A bill prepared by the Navy Department to authorize the government to take possession either by contract, lease or otherwise, upon the issuance of an executive order, of all oil land set aside as naval reserves in California or Wyoming, was to-day introduced by Senator Swanson, of the Naval Committee.—*Baltimore American*, 12/1.

AMERICANS FINISH WORK ON HAYTI MILITARY ROAD.—The military road between Port au Prince and Cape Haitien, built by the *gendarmerie* under the direction of the American army of occupation, has been finishd.

Lieutenant Colonel Butler, commanding the United States Marine Corps, in charge of the work, made the first journey over the highway in an automobile at the head of a gay procession to-day.

The occasion was a holiday, the people highly appreciating the work undertaken by the Americans and thus successfully completed.—*N. Y. Herald*, 21/12.

PASSES BILL TO PROTECT MYSTERIOUS INVENTION.—The House bill for patent protection of "Garabed," a mysterious invention, said to be a source of limitless energy, was passed to-day by the Senate. It now goes to President Wilson. At the close of the last session the President gave the bill a docket veto. Garabed T. K. Giragossian, a Boston Armenian, is the inventor. He declined to reveal his secret fully until Congress protected it, and made such satisfactory explanations to the Patents Committee that they recommended passage of the bill.—*N. Y. Herald*, 17/1.

CURRENT NAVAL AND PROFESSIONAL PAPERS

UNITED STATES

WORLD'S WORK. **January.**—Must Panama Come to Sea Level? by *Philippe Bunau Varilla Lorraine*. The Test of Victory, by *J. B. W. Gardiner*.

CURRENT HISTORY. **January.**—Sinking a Battleship in Trieste Harbor, by *Percival Gibbon.*

FLYING. **December.**—Can History Tell Us How to Win a Decisive Battle? by *Rear Admiral Bradley A. Fiske.*

THE NAVY. **December.**—Pages from the Log of the Raider *Moewe* (extracts from the commander's diary), by *H. W. Hitchcock.*

AMERICAN JOURNAL OF INTERNATIONAL LAW. **October.**—Diplomatic Mission of the United States to Russia (Addresses by *Mr. Root* and the *Russian Foreign Minister*). A Unique International Problem (Spitzbergen), by *Robert Lansing.* An Economic War after the War, by *John Bates Clark.* Violation of Treaties, by *Denys P. Myers.* The American Attitude toward Captures at Sea, by *H. C. Quigley.* International Relations of Japan, China, and the United States (editorial), by *James Brown Scott.*

GREAT BRITAIN

FORTNIGHTLY REVIEW. **December.**—The American Embargo, by *James D. Whelpley.*

NINETEENTH CENTURY AND AFTER. **December.**—The Invasion of Italy and the Classic Strategy of Prussia, by *Sidney Low.* The Pacifist Peril, by *J. C. de Chassaigne.* The Story of the Declaration of Paris, by *Sir Francis Piggott.*

ITALY

REVISTA MARITTIMA. **September.**—Tactics and Naval Artillery in the Battle of Jutland, by *Captain Silvio Salza.*

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U-[illegible] Hit by Yankee Destroyer, Sinks.

INTERNATIONAL NOTES

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NAVAL WAR NOTES

PREPARED BY

LIEUTENANT W. B. JUPP, U. S. Navy

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STRATEGY

ALLIED NAVAL COUNCIL FORMED.—Secretary Daniels has given out the following announcement, cabled by Admiral Benson, regarding the Allied Naval Conference held in Paris November 29 and 30, and the agreement to establish an allied naval council:

The conference held at the Ministry of Marine, at Paris, November 29 and 30, presided over by Monsieur Leygues, Minister of Marine, and the following delegates being present:

For France, M. Jules Cels, sous-secretaire d'Etat de la Marine; Vice Admiral De Bon, chief of the general staff.

For England, Sir Eric Geddes, First Lord of the Admiralty; Admiral Sir John Jellicoe, First Sea Lord.

For the United States, Admiral Benson, Director of the Bureau of Operations; Vice Admiral Sims, commanding the American naval forces in European waters.

For Italy, Vice Admiral Cusani Visconti, sous-chef d'Etat-major general.

For Japan, Rear Admiral Funakoshi.

The Naval Allied Council.—It has been decided to create a naval allied council in order to insure the closest touch and complete cooperation between the allied fleets. The task of the council will be to watch over the general conduct of the naval war and to insure coordination of effort at sea as well as the development of all scientific operations connected with the conduct of the war. The council will make all the necessary recommendations to enable the governments to make decisions. It will keep itself informed as to the execution of plans decided upon. The members of the council will report to their respective governments as may be necessary. The individual responsibility of the chiefs of staff, and of the commander-in-chief at sea, toward their governments as regards operations and, as well as the strategical and tactical disposition of the forces placed under their command, remains unchanged. It has been

decided that the council should consist of the ministers of marine of the nations represented and of the chiefs of naval staffs.

As the meetings of the council will of necessity be held in Europe the chiefs of the general naval staffs of the United States and Japan will be represented by flag officers nominated by their respective governments. The allied naval council will be provided with a permanent secretary, etc., whose business it will be to collect and collate all necessary information, etc. The council will meet as often as may be thought necessary under the presidency of the minister of marine of the country in which the meeting is held. The various admiralties will furnish the council with the information which is necessary for the work to be carried out.—*Official Bulletin*, 15/12.

WHY GERMANY DROVE AT ITALY.—A twofold object seems to have moved the Germans in their thrust upon Italy, one expressed and one concealed. The open reason given was the punishment of Italy for her defection from the Triple Alliance and as a demonstration of Teutonic might which should move us to seek peace. The unavowed object—which the censor carelessly allowed the Vienna correspondent of the *Frankfurter Zeitung* to let slip—was the heartening of Austria-Hungary, which, we are told, was anxious for peace at any price whatever. The *Frankfurter Zeitung* says:

"The recent victories on the Italian front have destroyed the hopes of Austrian advocates of peace at any price and the small party of pacifists in Hungary who are really working for the Entente. Nobody says any more that Austria-Hungary's war is really at an end. The population knows and feels it a matter of honor to return the military assistance rendered by Germany."

Turning to the "punishment" phase, we find the *Kölnische Zeitung* writing:

"German fists and German shells are up and at it, to wreak bitter vengeance for the wrong that has been suffered, while the Austro-Hungarian forces are paying out the wicked robber and teaching him not to stretch out his hand a second time after foreign peoples and foreign soil. The grievous sacrifices to which the two central powers have had to submit, and the augmentation of their troubles by the Italian desertion, justify the satisfaction which is to-day felt everywhere in German lands at the collapse of the Italian house of cards.

"Italy ought to have begun by building schools and teaching her people to read and write, in order to be able to guide them by the road of national culture and work to comfort and prosperity, instead of pursuing a windy *Machtpolitik*, and trying to enrich herself in bad company and by unworthy means."—*Literary Digest*, 15/12.

TRUTH ON WAR CONDITIONS.—*What America Must Do to Win World War.*—By Representative Tinkham.

1—Concentrate all possible efforts on the manufacture of a huge ocean tonnage.

2—Send wheat and corn to Italy to prevent revolution.

3—Contribute a large and splendidly equipped air service.

4—Send to American bases in France a greatly increased amount of general supplies.

The unvarnished truth was told to-day in the House by Representative George Holden Tinkham of Massachusetts, with the hope that it will awaken the War and Navy Department officials and the public generally to a realization that big action must be taken now to hold the world "safe for democracy."

In telling his opinions regarding what conditions are and what should be done at once to relieve them, Representative Tinkham said:

"It seems to be my duty to address the House upon my return from war-torn Europe and to submit to it some conclusions and impart information which I hope will be of some value.

"My information has been gathered from many sources—from personal observations and from conversations with men of various nationalities in military, naval, diplomatic, political and other employment.

"America wants the truth and it is vital that America have the truth. The picture of the military situation in Europe as reproduced in America is often not true, particularly in relation to America's military efforts there and the conditions in Germany. The truth in Europe, where America is to play her great and victorious part, is that to-day the central powers have achieved all of their greater military objectives, with the exception of the taking of Paris, the attempt to take Verdun being part of that purpose.

"Autocracy in Europe has democracy by the throat and is strangling it. The reasons for the success of autocracy are that autocracy is organized, deals more in deeds than in rhetoric, and modern autocracies are masculine and not feminine. Democracy to be successful in this the greatest struggle in arms of all times must organize better than autocracy, drop rhetoric for deeds and become masculine.

Conditions in France and England.—"I found the French soldiers and people courageous and unwavering in their dauntless loyalty. There is no avoiding the truth, however, that France is war-worn and has passed her meridian in man power and effort. She has plenty of food, with the exception of wheat and sugar. She has excellent military and political leadership.

"I found England's war efforts splendidly organized and her equipment complete. The English army is cheerful and confident. Large losses, such as 200,000 men in the last two months, I have heard criticized as unnecessary. The truth, however, is that England is at the height of her power, but it is a height which she can maintain, undoubtedly for one or more years. Under these circumstances, after three years of fighting, it seems impossible for France and England to obtain a military decision, and France and England frankly admit the absolute necessity of a colossal effort on the part of America.

"Much evidence shows that, although Germany is very short of food, she is not starving, and that the food situation in Germany is not as bad in some essential particulars as it was a year ago. There is also much evidence that Germany to-day has a larger number of men under arms than at any other time during the war, although their quality is not as good as formerly. The real social and political conditions in Germany are not much known, but it is not thought that there will be a revolution until after the war.

"The results in France of American efforts up to the first of December, in a strictly military way, have been practically negligible. The number of men there is much smaller than the American public believes; and although food and clothing were good in amount and quality, the lack of general supplies has a most demoralizing effect upon all preparations and efforts. I am not speaking of American artillery, aeroplanes, machine guns and ammunition, about which the American public now knows, but of such supplies as auto trucks, machinery, tools, wood, nails, camp kitchens and many other absolutely essential things.

"I saw some of the finest trees in France being cut for lumber. Modern war cannot be carried on without lumber in large amounts, yet there was not sufficient lumber to be used by the French and English troops in France. It is my fixed opinion that the sending of more American troops without adequate general supplies will be a disastrous blunder.

"The situation in Italy on the economic side is very perilous. All of the people north of Rome live on wheat and corn meal, and on the 1st of December there were only three months' supplies on hand. Unless America

is able to supply wheat and corn meal to Italy in sufficient quantities before it is too late a revolution such as occurred in Russia will not be unlikely.

"The submarine situation is much more acute than the people are allowed to believe. The total allied tonnage sunk per month which is not totaled for publication exceeds the new tonnage launched, and this has been so for many months, and will exceed the new tonnage launched until July 1, even if the plans of the allied governments are all carried through successfully. The Mediterranean is practically controlled by the submarines and the number of submarines and their efficiency seem to be increasing, although the American and British efforts against the submarines have been crowned with much success.

One Supreme Commander Needed.—"It is thought by those best informed on military matters that a supreme commander of all military efforts of the Allies should be chosen and given full power and authority.

"The best informed men in France and England believe a decisive military decision cannot be reached before 1919 or 1920, when America will be able to contribute her real military strength.

A War of Transportation.—"The war for America is a war of transportation, and America should concentrate all possible effort on the manufacture of a huge ocean tonnage. Wheat and corn should be immediately sent to Italy to prevent a revolution; America should contribute a large and splendidly equipped air service, and America should at once send to American bases in France a very much increased amount of general supplies.

"The winning of the war rests completely in the hands of America, in her forests, her furnaces, her farms, her men, her energy and her will. This war, cost what it may, in blood or treasure, strength and sacrifice, must be won for America's honor and America's future."—*Washington Evening Star*, 17/1.

THE INERTIA OF MODERN WAR.—The inexorable law of inertia, operating on the vast machinery of this war, forbids a decisive victory between armies that are equal, or even approximately equal, in numbers, munitionment, morale and leadership. A dozen battles have been fought since August, 1914, all of which were greater than any recorded in history, and any one of which would have been absolutely decisive in any era but our own.

Nobody seems to have foreseen this—not even the nation which for 40 years past has dreamed of war conquests, and made the military subjugation of other races the great goal of its national life. For we find in a book on the lessons of the war recently written by a distinguished German general, the astonishing confession that no absolutely decisive battle can be fought between equal and well-entrenched national armies, such as those now confronting each other on the western front.

Although this writer does not give us the reasons for his belief, they are not far to seek. It is the law of inertia applied to the enormous mass of a modern army that has pinned it fast, and put a heavy discount upon such shrewd, elastic and ever-daring strategy as that of the great Napoleon, and such lightning-like tactics as those of the veteran army that fought under him.

This is a war of artillery—heavy, semi-mobile artillery. In Napoleon's day artillery (light field artillery), was an adjunct of the infantry; to-day infantry is an adjunct of the artillery. The heavy artillery (6-inch to 12-inch) obliterates the enemy's defences; this done, the infantry takes possession. No further advance can be made until the inertia of the huge mass of guns, shells, ammunition dumps, railroad yards, tracks, machine shops, etc., has been laboriously overcome by ceaseless, herculean pressure, exerted for days, weeks and months. Finally when the full momentum has been attained it is expressed in days of "hurricane" bom-

bardments. Then the infantry can go forward—and they must only go so far.

Woe to that army which disregards this law of inertia. The British forgot or disregarded it at Cambrai. They moved far beyond the protecting arm of their heavy artillery—and paid the price. Not until they swung back within its shelter could they stand. When the tanks swept through the Hindenburg line, it looked as though a modern line could be permanently broken. So on they went, "horse, foot, and artillery," leaving the heavy stuff to come on at its leisure.

The British heavy artillery will ultimately take Cambrai and the infantry will consolidate and hold the position; but we think this recent venture will be the last attempt to introduce on the western front the open fighting of earlier wars. It simply cannot be done.

It is a curious paradox that a preponderance of heavy artillery at once makes victory possible and a decision impossible. It was an enormous preponderance of heavy artillery that enabled the Germans to break through the Russian lines at the Dunajec. It was the inertia of this artillery that prevented the victors from splitting up, encircling and capturing the Russian Armies—and so rendered the result indecisive.

The war will be won by the decimation of the German Armies *in situ*, by the allied preponderance of artillery. Even though they seek to save their diminishing man-power by remaining on the defensive—they must hold their lines, and in so doing must be subject to an overwhelming shell-fire attack from which there is no escape.

We can make no more important contribution to the allied cause than to mobilize every possible forge, factory and machine shop for turning out artillery of heavy caliber.—*Scientific American*, 29/12.

GERMANY PLANS AERIAL WARFARE ON GREAT SCALE TO MEET U. S. FLIERS.—With the American Army in France, Friday, January 4.—Germany's plan for aerial warfare on a larger scale than heretofore, it is indicated in documents taken from enemy prisoners, are founded upon published statements regarding the aerial warfare plans of the United States. Information to this effect has reached the American expeditionary forces.

It is indicated that the Germans, believing that America intended putting machines by the tens of thousands into the battle arena, immediately enlarged their own plans in the expectations of offsetting the increased enemy forces. Just when the enemy's program will be realized is uncertain, but the information obtained in captured documents is regarded by ranking officers as making it extremely desirable for a speedy and complete development of American air service.

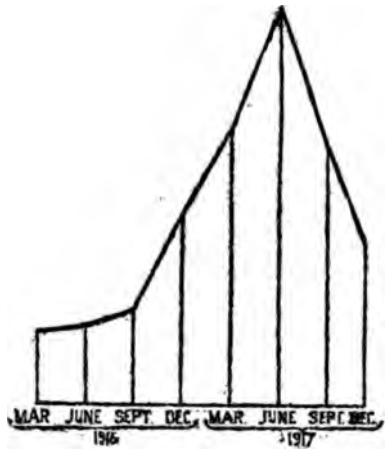
In cooperation with the Red Cross, Y. M. C. A. headquarters is busy completing arrangements for other centers than Paris; here the personnel of the American expeditionary forces can go when they are given leaves and have clean and healthy amusements such as movies, baseball, football, mountain climbing and other sports. It is hoped that these centers will prove substitutes for Paris, as permits to spend leave there have been suspended to all officers and men in the interests of temperance and morality.—*Washington Post*, 6/1.

EXPLAINS U-BOAT WAR.—The British Admiralty, on December 20, sent a statement to the press elucidating some remarks made in the House of Commons a week before by the First Lord, Sir Eric Geddes, on the losses suffered in the U-boat campaign by the merchant marine of the Allies and neutrals, together with the losses inflicted on Teutonic submarines. Sir Eric had said:

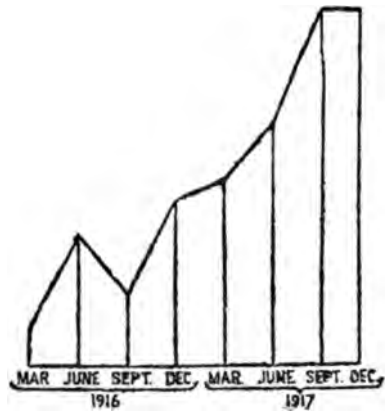
1. The demands on our merchant shipping are greater than ever.
2. The submarine menace is held, but not yet mastered.
3. Our shipbuilding is not yet replacing our losses.

4. I deprecate the drawing of deductions from the experience of any one week or month, be it good or bad. It is upon the general curve of all the factors that we must base our conclusions.

5. The downward trend of mercantile marine losses, both of ourselves and our allies, has continued satisfactory since I last spoke on November 1.



QUARTER ENDED. LOSSES OF MERCHANT TONNAGE.



QUARTER ENDED. GERMAN SUBMARINES SUNK.

6. The upward curve of merchant shipbuilding has also continued satisfactorily, and this curve will undoubtedly be maintained in an upward direction.

7. The upward curve of the destruction of enemy submarines has continued equally satisfactorily.

Subsequently Washington announced that the average rate of destruction of U-boats was 1.25 a day, or about 38 a month, while the German rate of construction was .75 a day, or about 23 a month. The statement of the British Admiralty with the diagrams above which accompanied it follows:

"In view of the statement made by the First Lord in the House of Commons on Thursday, the 13th inst., that the general curves of merchant tonnage sunk by enemy action and of German submarines sunk are satisfactory, it has been thought that the public would be interested to see these curves, and they are placed at the disposal of the press accordingly.

"With regard to the upper diagram, the height of the enemy submarine attack upon merchantmen was in April, 1917, and that accounts for the quarter ended June showing the 'peak,' since when the curve has steadily fallen, and in the last quarter of this year has reached the same figure as in the last quarter of 1916, which was before the unrestricted submarine attack began.

"The lower diagram shows that since the quarter ended September, 1916, there has been a steady rise in the number of submarines sunk, and although for the last quarter of 1917 the number sunk has not further risen, it must be remembered that there are still the results of half a month to add, and we have already equaled the results of the quarter ended September, 1917.

"Attention is particularly drawn to the notes at the foot of the diagrams, which explain that they are statistically accurate and drawn to scale, but that obviously the scale is not the same in both, the upper being for tonnage of merchant vessels and the lower for the number of submarines."

—*N. Y. Times*, 15/1.

U-BOATS PREYING ONLY ON SLOW SHIPS.—Commander Bellairs was recently quoted as saying in the House of Commons that, according to American figures, of merchant ships of under 9 knots, 90 to 100 per cent were sunk by submarines; of 9 and 10 knots, 70 per cent; 12 knots, 50 per cent; 18 knots and above, none. The *Lusitania* was the only vessel of high speed sunk. Supplementing this information, the British Admiralty reports that of the British tonnage actually sunk in September and October, about one-eighth only consisted of ships carrying food, over one-third of ships carrying coal, and the remainder of ships carrying miscellaneous commodities, or ships sailing outwards in ballast. It would appear from this that only the slow-moving cargo boats are succumbing to U-boat attacks.—*Nautical Gazette*, 3/1.

TRUE STATE OF GERMANY.—From the victory of the Allies at the Marne, that witnessed the first close cooperation of the British and the French in numbers, to the present time the outcome of the war has been a settled conclusion. That victory that absolutely shattered the cardinal point of German strategy, namely, to reach Paris in 30 days by way of devastated Belgium, will stand out in history as marking the turn of the tide against the Germans. They staked all on one throw after it was seen that England could not be prevailed upon to permit France to be throttled. And that cast was against them. Since then the war from the German side has been a stupendous effort to stave off the day for the Allies by piling up an unthinkable war equipment and marshaling the nation itself to arms. And every day the grim, cold and unsentimental British blockade has been strangling the German nation. Never for a moment has England made a distinction between the German Government and people such as was important for the United States to make in the interest of democratization of the German Empire. And the German people have felt the squeeze until their tongues literally are out and they are ravenous for food and rabid for peace.

All the while the hard ring of French and British artillery has become harder and harder. Penned in behind the lines, that are the real lines of invincibility and not those of Hindenburg, the Germans have scurried from point to point. They could not break the iron ring of France and England. They were more successful with that of Russia through chicanery and deceit, through fraud and corruption. And that is the reason

why the British premier, Lloyd George, in his address laid at the door of Russia its blood-guiltiness and declared that the Russians must work out their own destiny.

England has suffered in multi-thousands of killed. France has suffered to the point of critical sacrifice because of the defection of Russia. Not the Russia of Kerensky, but the Russia of the Bolsheviki, the radical overthrowers of all organized society in the name of liberty. As the best exponents of liberty Russia has now to offer, the United States must look beyond them to Russia itself. It, therefore, has no antagonisms but friendships to proffer. It does not, it will not and it cannot regard the Bolsheviki as presenting the best program of democracy for Russia, not to say the world. The crude internationalism of the latter has saving features that in time will find incorporation in the general democratic program for all free peoples.

The Germans turned to their submarines for the victory they found themselves unable to achieve on land. Having sought to carry the war into Egypt and to seize the Seuz Canal and to split the British Empire, and failed, they turned back to the sea. Beaten in the west, beaten in the east, reaping some harvest of success from the Russian defection, but a veritable Pandora's box of ills as well, they see even the submarine failing them. The one tragical fruitage of the submarine warfare for Germany was the entrance of the United States into the strife. And from that hour the doom of the submarine warfare was sealed.

What has Germany left to which to turn? It has still resources open to it of making a break with its fleet. But its foes have multiplied their sea power, already overwhelming, while Germany has been so bent upon building the submarines that have counted nothing for it in the outcome, as to be unable to carry on a considerable program for ships of the major orders. A dash with the fleet would be a dash to death. There remains now only the much talked of proposed gigantic west-side offensive. This may occur. But it will not occur before spring or summer, and then it will be a supreme act of national suicide. Between now and spring the gullet of the Germans—and who that is human does not have pity for the deluded or guileless of them who clamor for bread and are given a stone—will be well nigh closed. The true case for Germany is marked by the true state of Germany. It is a state of awakening from illusions, of abject and gnawing want and hunger, of revolt against the servility that has marked the German through this training for generations. The soul of free Germany is being born in the agonies of unparalleled suffering and the militarists cannot stifle this soul at its birth by their rapacious and inhuman calls for blood, for more blood, for reckless, wasteful shedding of blood—to no purpose!—*Baltimore American*, 12/1.

U-BOAT OPERATIONS.—In the present war, submarines have been employed for the first time as commerce destroyers. As such, they have proved themselves far more effective than warships, which can only traverse the surface of the seas. According to Captain Persius, the well-known German naval authority, the cruiser *Karlsruhe*, during her short-lived career, inflicted more damage on Entente shipping than any of the other German surface raiders. This vanished unit of the Kaiser's navy destroyed 17 vessels in all, representing 76,609 tons. Next in record to the *Karlsruhe* comes the cruiser *Emden*, which, in her spectacular cruise, sank 17 vessels of an aggregate tonnage of 73,895 tons. On her first raiding expedition, the *Moewe* bagged 15 ships, with a total tonnage of 57,746 tons.

These achievements of the German surface cruisers appear comparatively insignificant, however, alongside the toll taken by individual U-boats. At the head of the list stands the one commanded by Lieut. Commander Valentiner, which, according to German reports, was responsible for the destruction of 128 vessels, with an aggregate tonnage of 282,000 tons.

Estimated on a conservative basis, the value of these ships, with their cargoes, was probably not far from seventy millions of dollars. A close second is the submarine of which Captain Arnauld de la Pière was commander, with a record of 126 ships and 270,000 tons sunk. In case Germany's ruthless submarine campaign should be continued in the future with the same unabated vigor as in the past, it is possible that even these figures may be surpassed hereafter.—*Nautical Gazette*, 20/12.

ATLANTIC

TWO ON "JACOB JONES" TAKEN PRISONERS.—Two sailors were saved by the Germans from the American destroyer *Jacob Jones*, according to an official German announcement received December 18.

The *Jacob Jones* was torpedoed and sunk in the war zone on December 6 and 65 men on board were listed as missing. Survivors reported that one American who spoke German was taken away a prisoner on the submarine.—*Baltimore Sun*, 18/12.

LINER SINKS U-BOAT.—A German submarine was sunk by the fire of guns of an American passenger steamer approaching the British coast December 27, according to reports of the passengers and gunners aboard.—*Baltimore Sun*, 29/12.

UNITED STATES SUBMARINE "F-1" RAMMED AND SUNK BY THE "F-3" IN HOME WATERS.—Secretary Daniels authorizes the following:

The United States submarine *F-1* was rammed and sunk by the United States submarine *F-3* in a fog in home waters. The *F-3* was not injured and returned to port with five survivors of the lost vessel. Nineteen of the crew of the *F-1* are missing.—*Official Bulletin*, 19/12.

REPORT MYSTERIOUS GERMAN VESSEL OFF BRAZILIAN COAST.—Brazilian newspapers received December 27, are filled with accounts of the movements of a German corsair off the Brazilian coast a few weeks ago. The newspapers assert that the mysterious vessel was identified as a German, and that she unloaded an immense cargo of heavy cases at Cerqueira and Armacao.

Several days later the vessel returned to Armacao with additional cargo, which the newspaper accounts say it is believed she received from a larger ship out of sight of land. From Armacao the vessel proceeded to Calouro, where another portion of the cargo was unloaded.

These ports are not guarded, and it is asserted that the cargoes landed were mysteriously smuggled away. Later the German vessel was sighted close to shore at San Pedro de Aldera, where two persons are now under arrest as a result of their relations with the crew. They are accused of being spies.

The newspapers say the corsair disappeared as mysteriously as she came and that the Brazilians believe she brought supplies for a submarine base.—*N. Y. Herald*, 20/12.

DETAILS OF FOUR-HOUR SEA BATTLE WITH U-BOAT AS REPORTED BY THE "LUCKENBACH'S" COMMANDER.—A detailed account of the four-hour battle with the German submarine which attacked the American steamer *J. L. Luckenbach* on October 19 is given in the report made to the Navy Department by the commander of the armed guard on that vessel, which, though hit several times by shells, reached port safely.

At 7.30 a. m. the after lookout on the *Luckenbach* reported a steamer abeam. The commander of the armed guard sighted her himself about one point forward of the port beam. Upon looking at the steamer, which appeared very suspicious, through the glasses, a sail appeared on her. Both guns were trained on the steamer. The armed guard commander

then went aloft to obtain a better view. When he was halfway up the supposed steamer turned out to be a submarine and opened fire.

The *Luckenbach* immediately opened fire with both guns. The first two or three shots fired by the submarine fell about 2000 yards short. She was firing at long range. The *Luckenbach's* shots also fell short. As the submarine appeared to be closing in, the captain was told to put the stern of the *Luckenbach* to her, which he did. Distress signals were sent out by wireless.

The submarine closed in to about 2000 yards. Early in the battle one shot from the submarine landed on the deck forward on the port side and exploded in the gun crew's quarters, starting a fire which partially destroyed the quarters and burned the effects of the gun crews. The same shot burst the fire main. The fire main was blocked off and water finally got to the fire. Steam was also turned on the flames. Shortly after the first shot landed another shot struck the quartermaster's room, without doing much damage.

A shot landed near the stern and exploded, putting the after gun out of commission.

"At least 225 rounds were fired by the submarine, out of which there were only nine clean hits," the commander reports. "Pieces of shell were falling all around the deck. Two shots landed on the port side forward, striking the oilers' room and putting a large hole in the side; one landed on the port side at the water line, hitting the fresh-water tank and destroying most of the fresh-water supply. Another landed in the petty officers' mess room and exploded, putting the ash hoist out of commission and bursting the steam pipe, also wounding two men, one mess boy, and one fireman. One shot passed through the weather screen on the bridge and landed in the cargo, exploding but not starting a fire. Pieces of shell hit V. Louther, one of the armed guard, in three places. One of the ship's crew, who was carrying ammunition forward, was hit. Another shell exploded in the engine room, wounding the first and third engineers and putting the engine out of commission. Bell, one of the gun's crew, was going up the forward ladder carrying ammunition when the shell that landed in the quartermaster's room exploded, the fumes from the shell blinding him for about two hours."

"Never Surrender!" Flashed by Radio.—The distress calls sent out had been answered by a United States destroyer at 8.10, which was asked how quickly it could arrive at the scene. "Two hours," was the reply. The captain of the *Luckenbach* said: "Too late. Look for boats." "Don't surrender," came back the message, and the *Luckenbach* replied: "Never."

At about 11 a. m. smoke was sighted on the horizon. The vessel was headed toward the smoke to lessen the distance the destroyer would have to come. It was shortly after this that the engines were temporarily put out of commission by an explosive shell. At about 11.30 the destroyer fired her first shot at the submarine, which submerged 10 minutes later.

The *Luckenbach* had commenced firing about 7.40 and ceased firing at 11.40, 202 rounds being fired at the submarine.

"The ship's crew behaved creditably, no trouble being experienced in getting them to pass ammunition," the commander of the armed guard reports. "The firemen stayed below. Great praise is due the armed guard for the manner in which they performed their duty. The men stationed at the guns never flinched. When the after gun was put out of commission the after pointers came to the forward gun and relieved one another, as 167 rounds were fired out of the forward gun. H. Bolges, chief boatswain's mate, was a great help, doing most of the spotting from the top of the wheelhouse while the armed guard commander was taking care of things around the decks and guns."

The destroyer stood by until the engines were repaired, which took about two hours and a half, and then escorted the *Luckenbach* to a convoy, which was reached about 5 p. m.

All the members of the armed guard on the *Luckenbach* have been commended by the Navy Department for gallantry and devotion to duty, and the commander of the guard has been promoted, being given a temporary warrant as boatswain.—*Official Bulletin*, 14/1.

DESCRIPTION OF SINKING OF GERMAN U-BOAT AND CAPTURE OF ITS CREW BY TWO AMERICAN DESTROYERS.—Secretary Daniels to-day made public further details, given in reports of officers, of the destruction of a German submarine and the capture of the crew by American destroyers in November. The capture was made by the U. S. S. *Fanning*, assisted by the U. S. S. *Nicholson*. The *Fanning* was commanded by Lieutenant A. S. Carpender, Lieutenant G. H. Fort being the executive officer.

About 4.10 p. m., while escorting a convoy, the lookout of the *Fanning*, Coxswain David D. Loomis, sighted a small periscope about a foot above water some distance off the port bow. The periscope was visible for only a few seconds. The destroyer immediately headed for the spot and three minutes after the periscope had been sighted dropped a depth charge. The *Nicholson* also speeded to the position of the submarine, which appeared to be headed toward a merchant vessel in the convoy, and dropped another depth charge. At that moment the conning tower of the U-boat came to the surface between the *Nicholson* and the convoy. The *Nicholson* fired three shots from her stern gun. The bow of the submarine came up rapidly. She was down by the stern, but righted herself and seemed to increase her speed. As the *Nicholson* cleared, the *Fanning* headed for the U-boat, firing from the bow gun. After the third shot the crew of the submarine all came on deck and held up their hands, the submarine surrendering at 4.28 p. m.

The *Fanning* approached the submarine to pick up the prisoners, both destroyers keeping their batteries trained on the boat. A line was got to the submarine, but in a few minutes she sank; the line was let go and the crew of the U-boat jumped into the water and swam to the *Fanning*.

Although the crew all wore life preservers, a number of them were exhausted when they reached the side of the destroyer. As the submarine sank, five or six men were caught by the radio aerial and carried below the surface before they disentangled themselves. Ten of the men were so weak that lines had to be passed under their arms to haul them aboard. One man was in such a condition that he could not even hold the line thrown him. Chief Pharmacist's Mate Elzer Harwell and Coxswain Francis G. Connor (N. N. V.), jumped overboard after this man and secured a line under his arms. When he was hauled aboard every effort was made to resuscitate him, but he died in a few minutes. The four officers of the submarine and the 35 members of the crew were all taken prisoners.

After being taken on board the prisoners were given hot coffee and sandwiches. Though kept under strict guard, they seemed contented and after a short time commenced to sing. To make them comfortable the crew of the destroyer gave them their warm coats and heavy clothing.

The German officers said the first depth charge had wrecked the machinery of the submarine and caused her to sink to a considerable depth.

The submarine bore no number nor distinguishing marks. She was identified by life belts and by statements of an officer and men of the crew. One of the life belts had "Kaiser" marked on one side and "Gott" on the other.

The *Fanning* proceeded to port and transferred her prisoners under guard. As they were leaving in small boats, the Germans gave three cheers. The commanding officer of the *Fanning* read the burial service over the body of the dead German sailor, and the destroyer proceeded to sea and buried him with full military honors.

The commander of the *Fanning* reports that the conduct of all his officers and crew was excellent.

The British commander-in-chief, under whom the destroyers were operating, in a report to the British Admiralty, said: "The whole affair reflects credit on the discipline and training of the United States' flotilla," and added that the incident showed that the *Fanning* "is a man-of-war in the best sense of the term, well disciplined and organized and ready for immediate action." He concludes that the credit for this must be given her commander. He mentions as worthy of particular commendation Lieutenant Henry, deck officer of the *Fanning*, the coxswain who sighted the periscope, and the chief pharmacist's mate and coxswain who jumped overboard to rescue the drowning German.

The British admiral also commends the prompt action of the *Nicholson*, which completed the success of its sister ship.

The British Admiralty sent a telegram to the commander-in-chief directing him to express to the commanding officer, officers, and men of the *Fanning*, its "high appreciation of their successful action against enemy submarine."

Vice Admiral Sims, commander of the American forces operating in European waters, issued an order commending the officers and men of the *Fanning* and *Nicholson*. Coxswain Loomis was advanced to the next higher rating in recognition of his vigilance in sighting the periscope.—*Official Bulletin*, 31/12.

EXTENSION OF SUBMARINE ZONE.—Germany has extended her submarine zone to include the waters around the Cape Verde Islands, Madeira and a portion of those of French Senegal, all off the northwest coast of Africa. Through these waters lay important trade routes from the Pacific and Indian Oceans, South Africa and South America to Europe.—*Baltimore American*, 10/1.

HONORED FOR SINKING AMERICAN DESTROYER.—Emperor William has conferred the Order Pour le Merite on a submarine commander, Kophamel, on his return from a cruise to the Cape Verde Islands. During this cruise, Kophamel asserts, he sank an American destroyer and 14 merchantmen, most of them bound from the United States for Italy or France. He is said to have brought back 22 tons of copper as booty.—*N. Y. Herald*, 10/1.

DEPTH CHARGES ARE SMASHING U-BOATS.—"One of our submarines shot a heavily-laden steamer of 5000 tons out of a convoy. A violent enemy counter-attack followed.

"The destroyers left the convoy and followed the submarine and in the course of a few minutes dropped 39 water bombs around the spot where the U-boat was supposed to be submerged. Luckily they failed to hit her and our U-boat escaped unscathed.

"The same submarine was previously followed by two airplanes from midday until evening and pelted with 23 bombs but escaped."

The same newspaper contains an account of a submarine cruiser which had a narrow escape from destruction in the explosion of a munition ship which she torpedoed from too close a range. The steamer, runs the account, blew up, "with a terrific detonation, wrapped in a column of flame, and the next second the flames disappeared and the steamer was gone."

The force of the explosion upset the submarine's steering apparatus and did other damage, but the crew finally succeeded in effecting repairs so that the U-boat managed to get into port.—*Baltimore American*, 16/1.

SUBMARINE IN SOUTH ATLANTIC.—On December 9 there was a rumor in Buenos Aires that a German submarine had been seen in the Atlantic, somewhere off Rio. On the following day the Spanish Premier made an official announcement that the Spanish steamer *Claudio*, bound from America for Spain, had been bombarded by a German submarine. On

December 14 a Lisbon cable stated that Funchal, Madeira, which is on the route from the English Channel to the Cape Verde Islands, was bombarded by a German submarine, 40 shells having been fired and a number of persons injured.

Some of these incidents may have been identified with the submarine that was commanded by Commander Kophamel.—*New York Times*, 6/1.

SUBMARINE SIGHTED IN GULF OF MEXICO.—Guards have been stationed at all coast artillery batteries here to-day and a close watch is being kept on all shipping following wireless reports that a submarine had been sighted by two American patrol boats 100 miles south of the Galveston Bar.

Military authorities declined to discuss the report further than to admit such a report had been received.

All coast artillery troops absent on leave were immediately summoned to man batteries.

The report received said that the submarine mounted two guns and that it submerged and was not seen again when the American patrol boats gave chase.

Navy Has No News.—Washington, January 14.—The Navy Department was without information to-day of the hostile submarine reported seen in the Gulf of Mexico.—*Baltimore American*, 14/1.

AMERICAN TRAWLER LOST.—Washington, January 14.—An American trawler operating in European waters has been lost by striking a rock. Admiral Sims reported the sinking of the little vessel to the Navy Department to-day. All members of the crew were saved.—*Baltimore American*, 15/1.

FOURTH LUCKENBACH STEAMER TORPEDOED.—New York, January 7.—The American steamship *Harry Luckenbach* has been torpedoed and sunk with loss of life, according to word received by the owners of the vessel to-day.

Eight of the crew are missing, the owners were informed. The crew consisted of 30 men, not including the naval guard.

When last heard from by the owners the *Harry Luckenbach* was in France, having been requisitioned at a French port October 15 by General Pershing for use as a supply ship of the United States Shipping Board. It is believed she was sunk in the English Channel.

The vessel was in command of Captain F. S. Jones. No information as to the identity of the eight men reported missing has been received.

The *Harry Luckenbach* was built in 1881 at West Hartelpool, Eng., under the name of the *Surrey*, and was also known as the *Michigan* before her purchase by the Luckenbach Steamship line. She was registered at 2798 tons gross.

The *Harry Luckenbach* is the fourth ship of the Luckenbach line lost through submarine attack since the war began. The others were the *Jacob Luckenbach*, sunk July 7, 1916; the *Lewis Luckenbach*, October 14, and the *D. N. Luckenbach*, October 27 last year. Five members of the crew of the latter were killed. Another ship of the same line, the *J. L. Luckenbach*, had a four-hour running fight with a submarine the same month but escaped, although a number of her crew were killed by shell-fire. The total gross tonnage of the four ships sunk is 12,508.—*Baltimore American*, 9/1.

"COME AND GET ME"; NIGHTLY TAUNT TO U. S. DESTROYERS.—Commanders and crews of the American destroyers operating in European waters are talking about a grim piece of Hun humor. Nearly every night the commander of one of the destroyers receives by wireless a message reading:

"My position is (so many) degrees north and (so many) degrees west. Come and get me. I'm waiting for you." The message is always signed Hans Rose.

Rose is the German who took a submarine into Newport two years ago, welcomed society aboard his craft and then went out and sank several steamships almost within shooting distance of Nantucket. According to the story passed around by the men engaged in the thrilling and hazardous task of seeking submarines, the captain to whom is directed the nightly messages of the German subsea craft sank two. The commanders of both were intimate friends of Rose. He has sworn vengeance. Not only does he send his taunting message to the man he has never seen, but he goads him further by flashing a message defining the position of the destroyer.

It is disquieting for the American commander, but he has no fears. Twice, it is stated, he has swiftly guided his craft to the location described by his enemy, but has found nothing and seen nothing. Still the mysterious wireless dispatch comes every night, no matter where the destroyer may be. Others catch it, and thus the weird story is told wherever the hornets of the sea are seen.—*N. Y. Herald*, 17/1.

BAGLEY RECORDS HEROISM OF HIS MEN.—Secretary Daniels to-day made public a summary of the report made by Lieut. Commander David W. Bagley on the sinking and loss through German submarine attack of the American torpedo-boat destroyer *Jacob Jones*, of which he was the commander, on December 6. The location of the destroyer when attacked is not disclosed, but from the fact that Commander Bagley and four others were able to go in a motor dory to the Scilly Islands, it is still believed here that the attack occurred at a point in the Atlantic nearer to those islands than to any continental port.

Commander Bagley has especially commended the work of the following officers and men of the *Jacob Jones*:

Scott, Lieutenant Norman, St. Louis.
Richards, Lieutenant J. K., Washington.
Kalk, Lieutenant S. F. (Junior Grade), Washington.
Gates, Lieutenant Nelson N. (Junior Grade), Bay City, Mich.
Charlesworth, Charles, boatswain's mate, first class, New York.
Burger, Philip J., seaman, second class, Lansingburg, N. Y.
Kelly, Laurence J., chief electrician; next of kin and home address not given in department records.
Chase, Howard U., Quartermaster, third class, Nantucket, Mass.
Gibson, Harry Louis, chief boatswain's mate, Philadelphia.
Meier, Edward, water tender, Bay City, Mich.

Bagley's Report Summarized.—The summary of Commander Bagley's report was made public as follows:

The destroyer *Jacob Jones* was struck by a torpedo at 4.21 p. m. on December 6, 1917. The torpedo was sighted about abeam when at a distance of approximately half a mile. The officer of the deck, Lieutenant S. F. Kalk, who afterward died of exposure, took prompt and efficient measures to maneuver the ship so as to avoid being struck by the torpedo.

The commanding officer and Lieutenant Norman Scott, the executive officer, who were in the charthouse, heard the warning call that was given on the sighting of the torpedo and jumped at once to the bridge, where the commanding officer continued the maneuver begun by Lieutenant Kalk.

The commanding officer realized immediately that the torpedo was too near to allow time for the destroyer to maneuver clear of it. The torpedo struck abreast of a fuel oil tank, and immediately three large compartments were flooded, the deck over the fuel oil tank blown off, and the ship and fittings damaged in other ways. The ship quickly settled by the stern, and the engine room was soon flooded.

As the radio antennae and mainmast were carried away, and electric power failed immediately, it was not possible to use the radio apparatus. Two signal shots were fired from one of the guns. Immediately after the ship was torpedoed, and it was realized that she would sink, all efforts were bent toward launching rafts and boats, also splinter mats and lifebelts.

The gunnery officer, Lieutenant J. K. Richards, made every effort to get after to secure the depth charges, but was unable to do so. Before the ship sank three rafts were lost and another floated off when the destroyer went down. A small motor dory and two other small boats floated clear. The motor boat was seaworthy, but its engine would not run. One of the small boats was damaged, but was of use in getting men on the rafts. The whaleboat was launched, but was useless owing to damage from the explosion.

As the ship settled the commanding officer ran along the deck and ordered everybody to jump overboard. Most of the men who were not killed by the explosion got clear of the ship and reached rafts of wreckage, although a few were seen to be swimming at a considerable distance from the ship, having probably jumped overboard after the torpedo struck the vessel.

Destroyer Sank in Eight Minutes.—Eight minutes after being struck the destroyer sank stern first. About 15 minutes after the ship sank, the submarine came to the surface, approached within a half a mile of the rafts and picked up two survivors, although at the time only one was seen to be taken aboard. The submarine then submerged and was not seen again. Immediately after the sinking the commanding officer, who jumped overboard as the ship sank and was picked up by the motor dory, had efforts made to get all survivors on the rafts and get the rafts and boats together. He then began to make arrangements to reach the nearest land in the motorboat, so as to bring assistance to the survivors on the rafts. Lieutenant Richards received orders to take charge of the survivors and keep the rafts together.

The commanding officer and the navigating officer, Lieutenant Scott, knew accurately the position of the ship when she sank, and also knew the course to the nearest port. They therefore made the trip in the motor dory with four men to assist. All the provisions and medical kit from the motor boat were left with the men in the rafts, except a few emergency rations and half a bucket of water. The boat had to be pulled by oars, as the engine would not run.

After a very trying trip, during which it was necessary to steer by the stars and by the direction of the wind, the boat was picked up at 1 o'clock the next afternoon by a small patrol vessel. The senior officer of the station to which this patrol vessel belonged informed Lieut. Commander Bagley that the other survivors had all been rescued.

One small raft which had been separated from the others from the time of the sinking was picked up by the steamship *Catalina* at 8 p. m. on December 6. The remaining survivors were picked up at 8.50 a. m. on the 7th by a British patrol vessel.

Out of the total of seven officers and 103 men two officers and 64 men were lost. Two of these were captured by the submarine.

Commander Bagley gives unstinted praise to the behavior of officers and men.

Lieutenant Norman Scott, executive officer, accomplished a great deal toward getting boats and rafts in the water, turning off steam from the fire room to the engine room, getting life belts and splinter mats from the bridge into the water, in person firing signal guns, encouraging and assisting the men and, in general, doing everything possible in the short time available. He was of invaluable assistance during the trip in the dory.

Lieutenant J. K. Richards was left in charge of all the rafts, and his coolness and cheerfulness under exceedingly hard conditions were highly commendable, and undoubtedly served to put heart into the men to stand the strain.

Lieutenant Kalk, in the early part of the evening, although already in a weakened condition, swam from one raft to another in the effort to equalize weight on the rafts. The men who were on the rafts with him say that "he was game to the last."

Lieutenant Gates is reported calm and efficient in the performance of duty.

Gave Part of His Clothing to Others.—During the night Charles Charlesworth, boatswain's mate, first class, removed parts of his own clothing, when all realized that their lives depended on keeping warm, to try to keep alive men more thinly clad than himself. Commander Bagley recommends that he be commended for his action.

At the risk of almost certain death Philip J. Burger, seaman, second class, remained in the motor sailboat and endeavored to get it clear for floating from the ship. While he did not succeed in accomplishing this, which undoubtedly would have saved 20 or 30 lives, he stuck to duty until the very last, and is recommended as being most worthy of commendation. He was drawn under the water with the boat, but later came to the surface and was rescued.

L. J. Kelly, chief electrician, and Howard U. Chase, quartermaster, third class, remained on board until the last, endangering their lives thereby, to cut adrift splinter mats and life preservers. Kelly's stamina and spirit were especially valuable during the motor dory's trip.

H. L. Gibson, chief boatswain's mate, and Edward Meier, water tender, were of great assistance to the men on their rafts in advising and cheering them up in most adverse conditions.—*N. Y. Times*, 12/1.

IDENTITY OF TWO SEAMEN, TAKEN BY U-BOAT LEARNED.—The Navy Department has been informed through the Red Cross that the two men of the *Jacob Jones* captured by the German submarine which sank that destroyer on December 6 are Albert De Mello, seaman second class, and John Francis Murphy, ship's cook first class. They are held prisoners in Germany.

De Mello's father, Antonio V. De Mello, resides at 121 Hathaway Street, New Bedford, Mass.

Murphy's name was given as "Marfee" in a previous dispatch and a second inquiry was necessary to establish his identity.

Murphy gave as his next of kin, mother, Mrs. Julia Murphy, 53 Hall Avenue, Newport, R. I.—*Official Bulletin*, 10/1.

NORTH SEA

THE STORY OF H. M. TORPEDO-BOAT DESTROYER "SHARK," IN THE ACTION OFF JUTLAND BANK, MAY 31, 1916.—H. M. S. *Shark*, under the command of Commander Loftus W. Jones, went into action about 4.45 p. m. on the 31st of May with a complement of 91 officers and men. Of that number only six saw the dawn of June 1.

In spite of the soul-shaking experience through which they passed, these six men have remembered sufficient details of the action to enable the following record to be pieced together. Many stirring acts of gallantry and self-sacrifice, and much of interest to the relatives and friends of those who were lost, must inevitably be lacking from this narrative. But the evidence shows such supreme human courage and devotion to duty in the face of death that, incomplete as it is, the story remains one of the most glorious in the annals of the British Navy.

At 2 o'clock in the afternoon of May 31 the *Shark* and three other destroyers, *Acasta*, *Ophelia* and *Christopher* were acting as a submarine screen to the third battle cruiser squadron, with the light cruisers *Chester* and *Canterbury* in company. The force was steaming on a southerly course in advance of the British battle fleet, which was engaged in one of its periodical sweeps of the North Sea.

This advance squadron was under the command of Rear Admiral the Hon. Horace A. L. Hood, C. B., M. V. O., D. S. O., flying his flag in *Invincible*.

The main battle cruiser fleet and the fifth battle squadron were considerably further to the southward, and at 2.20 p. m. the light cruisers

attached to this force signalled by wireless the first intimation that the enemy's fleet was at sea. Subsequent reports confirmed this, and acting on the information contained in these intercepted messages, Rear Admiral Hood ordered the ship's companies to "action stations" and shaped course to intercept the advancing enemy.

At 3.48 p. m. the battle cruiser fleet and the fifth battle squadron engaged the German main fleet and turned north with the object of drawing the enemy towards the British battle fleet. It must be remembered that at this point the enemy was presumably in complete ignorance of the approach of the British main fleet. The weather was hazy, with very little wind and patches of mist that reduced the visibility to an extent that varied from one to eight miles.

At 4.04 p. m. Rear Admiral Hood received orders from Admiral Sir John Jellicoe, Commander-in-Chief, to proceed at full speed with his squadron and reinforce the battle cruiser fleet; the third battle cruiser squadron altered course as necessary and an hour and a half later the first sounds of firing reached them out of the mists ahead.

The first faint intermittent murmur of sound increased momentarily as the two forces converged, and at 5.40 p. m. the haze on the starboard bow was pierced by flashes of gun-fire; a few minutes later a force of German light cruisers and destroyers became visible, heavily engaged with an unseen opponent to the westward.

Fire was immediately opened, and Rear Admiral Hood turned to starboard, bringing the enemy onto the port bow of his squadron. Three light cruisers, a flotilla leader and 10 destroyers were now visible, the latter apparently turning to launch a torpedo attack upon the third battle cruiser squadron. The four destroyers which had hitherto been disposed in two subdivisions, one on each bow of the *Invincible*, were thereupon ordered to attack the enemy. Led by Commander Loftus Jones in *Shark*, the division swung around and hurled itself at the German force, opening fire with every gun that would bear.

In the meanwhile the enemy opened a heavy though ill-directed fire on the battle cruisers. A large proportion of the shots were falling short, and the British destroyers had in consequence to advance through a barrage of fire which surrounded them on all sides with columns of water and bursting shell.

In spite of their numerical superiority the German destroyers turned away in the face of this determined onslaught, and Commander Loftus Jones satisfied that the intended torpedo attack on Rear Admiral Hood's squadron had been frustrated, and having fired two of his three torpedoes, turned 16 points to regain his position on the bow of the *Invincible*. The remaining three destroyers followed in his wake.

Three German battle cruisers had then appeared out of the mist in support of the enemy light cruisers, and the gallant division with *Shark* at their head turned under a concentrated deluge of shells from the entire German force.

A fragment of a projectile struck the *Shark's* wheel, shattering it and wounding the coxswain, Petty Officer Griffin, on the right hand. The captain immediately ordered the after wheel to be manned and followed the coxswain down the ladder to the shell-torn upper deck to con the ship from aft. The yeoman of signals, Petty Officer Banham, who up to this point had been the third occupant of the bridge, hurried after the captain.

The enemy were now using shrapnel, and the captain was wounded in the thigh and face as he reached the bottom of the ladder. He stumbled aft, endeavoring to stanch the flow of blood with his hands, to find on reaching the engine room hatchway that a shell had burst inside the engine room and the main engines and steering gear were completely disabled. The coxswain had been struck at the same time as the captain, and dropped insensible from a wound in the head. The foremost gun, under the command of sub-Lieutenant Vance, had been blown away and only one survivor of its crew lay badly wounded amid the wreckage.

The *Shark* was then lying with disabled engines helpless under a heavy fire, and Lieutenant Commander John O. Barron, who commanded the *Acasta* and had been second in the line, gallantly brought his destroyer between the *Shark* and the enemy's fire and signalled to ask if he could be of any assistance. The captain of the *Shark* was then aft cheering and encouraging the crews of the midship and after guns. The yeoman of signals who remained at his side read the signal and reported it to the captain, who replied, "No. Tell him to look after himself and not get sunk over us."

The yeoman of signals accordingly semaphored Commander Jones' last signal to the division under his orders, and the *Acasta* followed in the wake of the other two boats which were rejoining the battle cruisers.

It is probable that at this juncture Rear Admiral Hood sighted the British battle cruiser fleet, which he had been ordered to reinforce, and proceeded to carry out his orders. The third battle cruiser squadron vanished into the mist and the enemy closed in upon the *Shark*, which lay rolling helplessly in the swell, blazing defiance from her after and midship guns.

The after gun was almost immediately put out of action and its crew killed or wounded. Amid a hail of shrapnel bullets and flying splinters the spare torpedo was hoisted off the rack, and under the directions of the captain, was being launched into the tube, when it was struck by a shell and burst with a violent explosion, causing heavy casualties.

Only one gun, the midship one, now remained in action. The ship was settling down by the bows and every moment she shuddered with the impact of a fresh hit. The riven upper-deck was a shambles, and the dead, mingled with shattered wreckage, were blown hither and thither by the blast of exploding shell. Projectiles, pitching short, flung great columns of water into the air, or passed screaming overhead; the upperworks were riddled by splinters from bursting shells.

One by one the wounded crawled brokenly into the lee of the casings and funnels in pitiful attempts to find shelter; among them knelt the devoted figure of the surgeon, endeavoring single-handed to cope with his gallant hopeless task. When last seen he was bandaging a man who had lost a hand when the torpedo exploded. He was then himself severely wounded and was apparently shortly afterwards killed.

The enemy had then closed in to a range of about 1500 yards; the survivors of the engine room staff had come on deck and the captain ordered the collision mats to be placed over the shot holes and every attempt to be made to plug them and keep the ship afloat. This was accordingly done under the direction of Lieutenant Ernest T. Donnell, the first lieutenant, who appears to have been still unwounded and maintained a cheering spirit of indomitable pluck to the last. The coxswain, who had recovered consciousness, though half blinded by blood from his wound, superintended a party who, under the captain's orders, were turning out the boats and endeavoring to launch the rafts. The boats were smashed by shell-fire while still at the davits, but three rafts—two regulation life-saving rafts and an extemporized affair of four barrels lashed together—were placed in the water.

In the meanwhile the midship gun, under the command of Midshipman T. Smith, R. N. R., maintained a steady fire. The stock of percussion tubes threatened to run short at one time, and the gunner, W. Gale, though severely wounded, crawled down below and brought a fresh supply, shortly after which he was killed. Leading Signalman Hodgetts, who had been previously working as one of the ammunition supply party, was blown overboard by the explosion of a shell; a few minutes later his dripping figure appeared over the rail and he cooly resumed his work. By some curious freak of chance he was again blown overboard by the blast of a shell, but again he clambered back to his place of duty, and his death.

The crew of the midship gun was ultimately reduced to two men, Able Seaman Howell, the gunlayer, and Able Seaman Hope. The midshipman

trained the gun while Hope loaded and Howell fired. The captain stood beside the gun giving them the range, heartening the remnant of the crew by his example of cool courage. Howell, who had been severly wounded eventually dropped from loss of blood, and the captain took his place. A moment later he was himself struck by a shell which took off his right leg above the knee.

He lay on the deck in the rear of the gun while the coxswain and a chief stoker named Hammell between them improvised a tourniquet from a piece of rope and fragment of wood. While they were endeavoring to stop the bleeding, Commander Loftus Jones, in the words of an eye-witness who survived, "Gentleman and Captain as he was" continued to direct the firing of the gun.

In all history the unquenchable Spirit of Man has rarely triumphed so completely over shattered nerves and body. As his strength ebbed Commander Loftus Jones seems to have been overtaken by fear lest the ship should fall into the hands of the enemy, and seeing the German destroyers approaching, he gave orders for the *Shark* to be sunk. A moment later, however, the gun fired another round and apparently realizing that the ship was still capable of further resistance he countermanded the order, adding, "Fight the ship!"

The gaff on the mainmast at which the ensign was flown had been broken by a shot, and the flag hung limp against the mast. The mind of the captain must have turned at the last to that emblem of all he was dying for so gallantly, for presently he asked faintly what had happened to the flag. One of the men tending him replied that it had been shot away, and in great distress he ordered another to be hoisted immediately. Able Seaman Hope accordingly left the gun, and climbing up, detached the ensign and handed it down to Midshipman Smith who bent it on to a fresh pair of halyards and hoisted it at the yard-arm. The captain seeing it once more flying clear said, "That's good," and appeared content.

The end was now drawing very near. The bows of the *Shark* had sunk until the foremost funnel was awash, and the waves were lapping over the water-logged hull. Seeing that two German destroyers had approached to within a few hundred yards with the evident intention of administering the *coup-de-grace*, Commander Loftus Jones gave his last order to the ship's company, "Save yourselves."

He was helped into the water by the coxswain and a number of others who had tended him devotedly after he received his mortal wound, and floated clear of the ship with the support of life-belt. The remainder of the crew to the number of about a score swam towards the rafts and pieces of floating wreckage.

Two torpedoes struck the *Shark* amidships almost simultaneously. With a muffled explosion she lurched violently to starboard, flinging overboard the dead and wounded who still remained on deck. Her stern rose until it was almost perpendicular and she sank with colors flying, about an hour and a half after firing her first shot.

Stoker Petty Officer Filleul and Able Seaman Smith succeeded in placing the captain on the raft of barrels, where they propped him in a sitting position with the aid of life-belts and buoys. While this was being done the captain attempted to smile, and shook his head saying, "It's no good, lads."

Stoker Petty Officer Filleul remained by the captain, and Able Seaman Smith swam to one of the other rafts on which Griffin, Chief Stoker Newcombe, Yeoman of Signals Banham, Stoker the Coxswain, Petty Officer Swan and Able Seamen Hope and Howell had succeeded in crawling. The three rafts drifted within sight of each other through the long northern summer twilight.

Shortly after the *Shark* sank the British battle cruisers swept past in pursuit of the enemy. The captain asked if the pursuing ships were British Filleul replied that they were, and the captain said, "That's good!"

Not long afterwards his head fell forward and his gallant spirit fled.

The second life-saving raft had been so damaged by shell-fire that only two men could be accommodated upon it. The two most severely wounded (one of them had lost a leg) were helped on to it by a number of others who themselves clung to the edge, among them being the first lieutenant. Able Seaman Smith, on the other raft, realizing that the majority were badly wounded and being himself only slightly hurt, swam over to render what assistance he could. The first lieutenant, who had unfailingly cheered and comforted the stricken little band, presently asked if any could still sing, and then, without faltering, himself began:

"Nearer, My God, to Thee."

Those who had the strength joined in as they clung submerged up to their shoulders in the icy water, almost unrecognizable from the thick black oil which floated on the surface; and so, one by one, death overtook them. Able Seaman Smith alone survived more than a couple of hours.

While it was still light the British battle fleet was sighted through the mists, and the drenched, haggard figures on the other raft cheered it as it passed five miles away. With indomitable optimism they all clung to the hope of a speedy rescue, and Able Seaman Howell semaphored across the waste of water, "We are British," in the hope that it would be read by one of the distant ships.

The twilight deepened into dusk and the raft on which Able Seaman Smith alone survived was lost to sight. The six occupants of the other sat with the waves washing over them, nursing their wounds and debating the prospects of being picked up. The yeoman of signals rambled into delirium at times and finally said, "I must have a sleep. Let me get my head down."

Able Seaman Hope attempted to dissuade him but without avail. "I must sleep," he insisted pathetically, and as he stretched himself in the bottom of the raft the ruling instinct of the service came back through the mists of death. "Give us a shake if the captain wants anything," he said, and his loyal spirit passed to join that of his captain.

Shortly before midnight the distant lights of a steamer were sighted. Able Seaman Howell then remembered for the first time that he had fastened a Holmes' light with wire on one of the rafts a few days previously. Steadying himself with difficulty on the pitching raft he fumbled along the edge and presently found the little tin cylinder that was to prove their salvation. With the last remnants of his failing strength he wrenched the nippel off, and the carbide, ignited with the water that washed over them, burnt with a bright flare. They waved it frantically and tried to shout; but the flare was seen and presently out of the darkness loomed the hull of the Danish S. S. *Vidar*. Her captain brought the ship alongside the raft, and one of her boats, which had already picked up Able Seaman Smith off his raft, presently rejoined them.

All survivors have testified to the high courage of Able Seaman Hope. Throughout the whole ordeal his plucky personality came constantly to the fore, and he alone retained strength to climb on board the *Vidar* unaided. On reaching the upper deck he refused to go below or receive any attention until the remainder of his shipmates had been hoisted on board.

The *Vidar* cruised in the vicinity for upwards of two hours in the hope of picking up further survivors, and Stoker Petty Officer Filleul was seen floating on the water and rescued as he was losing consciousness. No further traces of the *Shark's* crew were found, however, and the *Vidar* shaped course for Hull. On the passage Chief Stoker Newcombe, who had been wounded at the commencement of the action, succumbed to exhaustion in spite of every endeavor to save his life.

His Majesty the King, in recognition of the valor of the captain, officers, and men of the *Shark*, granted Commander Loftus W. Jones, the only posthumous honor that can be awarded in either service, the Victoria Cross. The six survivors, each of whom had played his part with the utmost gallantry, were decorated with the Distinguished Service Medal.

A few weeks after the action the fishermen of the little village of Fiskebackskie, an the coast of Sweden, found washed ashore the body of Commander W. Loftus Jones, V. C. It was buried in the village church yard on the 24th of June, with every token of sympathy and reverence.—*Navy and Merchant Marine*, December.

THE WAR AT SEA.—By a British Naval Officer.—The Admiralty made a further announcement on the subject of the action in the Heligoland Bight on Saturday, November 17. It will be remembered that in the announcement made earlier it was stated that the Admiralty were yet without detailed information as to the operation. In the further *communique* and that issued by the Germans on the same day it was revealed that the British force which engaged the enemy was an advanced body which actually pursued the enemy through his own minefields. This advanced force only broke off the engagement and turned back to meet its supports outside the minefields when four enemy battleships and battle cruisers were sighted. That the affair did not attain larger proportions was due to the fact that the British supporting force found the area within the minefields too restricted to maneuver in, and the enemy were too cautious to venture outside the minefield. It was suggested in these columns that this affair, like others of a similar nature which had previously occurred, was more or less accidental—that is to say, it did not arise from a concerted operation against the Germans, such as the action which the Admiralty reported to have had both "fortunate and fruitful" results in September, 1914. It was regarded, in fact, as a casual encounter brought about by the vigilance and energetic action of the British patrols rather than what was officially described three years ago as "a sweeping movement," designed "to cut the German light craft from home and engage them at leisure" in the open sea. Sir Cyprian Bridge, in an article in the *Sunday Times*, appears to take this view also, since he says that scraps of the character of that of November 17 "tend to test not only the efficiency of the look-out kept by the navy, but also its quality when suddenly confronted with an enemy force." The British patrols are not engaged in cruising about the North Sea aimlessly, but there must be many, many days and nights when they are "on the spot" to no purpose, and, considering the vast expanse of water to be covered, it can surprise no one if it is only at comparatively long intervals that a hostile collision actually takes place.

This action in the Bight should serve as a reminder to the public of the entirely changed condition in those waters since the scooping action was put in execution a little more than three years ago. There is not a word in the official *communiqué* of that time of danger to be expected from the minefields of the locality where the engagement took place. Indeed, it was only from the reports of the submarines that it was known there were minefields there at all, and these were probably of small dimensions. Matters are very different to-day, and without a large force of mine sweepers and their covering vessels it may be questioned whether what Admiral A. H. Christian described in his report of the affair of August 28 as "a reconnaissance in force" could be carried out. Naturally, however, if our patrols in their cruises along the outer edge of the German minefield should chance to sight a detachment of the enemy they would most certainly endeavor to engage it and, if possible, prevent it from returning to safety. This is clearly what happened on this occasion, and it was possible to continue the chase through the minefields because the flying enemy showed the way. Sir Cyprian Bridge, in the article already referred to, suggests as a reason for the enemy being sometimes found outside his fixed defences, that the German naval authorities having said that they can send their men-of-war to sea, find it necessary to give occasional proof that this is really done. There may, however, be other reasons. It will have been noticed that the enemy detachments sighted by our patrols usually include minesweepers, and it may be conjectured, therefore, that the enemy when

contemplating a raid or "an enterprise directed northward," find it expedient to insure that a passage exists for the force they desire to employ. It is not easy to believe that the German naval authorities hold it necessary to risk their ships merely to make good the boastful assertions with which they gratify their people. Even the misleading messages in which, by wireless, they announce an engagement when it does come off cannot disguise the fact that their main fleet refuses to accept action and its small craft are driven to take shelter. In August, 1914, the *Cologne Gazette*, in what was evidently an inspired article, said: "Great Britain calculates on the German fleet, on account of its fighting courage, being tempted to risk itself in a foolhardy manner. But the German naval authorities will not fulfil the British expectation." The German naval authorities never have had any idea of sending out the High Sea fleet to sea to try conclusions with ours in a general action, and, after Jutland confirmed their apprehensions of what might happen, they never will.

The announcement of the German Government that it has extended its "barred zone" is on a par with other declarations of "frightfulness." It is intended, according to the *Berliner Tageblatt*, to facilitate the task of the submarine, but exactly how it is to do so the German newspapers do not explain. The official notice states that the widening of the zone consists chiefly of an extension to the westward of the danger area which encircles this country, but there have been no signs up to the present that the submarines have put any limit to their activities in this direction. This may be said also of the new barred zone to be created around the Azores. Possibly they may now have a greater number of the larger submarines which are enabled by their size to exercise a more extended mobility, but by this time the Allies are not without means for meeting the threat of the heavier boats, as they have met that of their lighter consorts. The closing of the alleged free channel to Greece has already been anticipated, and it may be concluded that the official notice is deemed by the German authorities to be a concession to the feelings of their friends in that country. Like the notice about the respite to neutral ships and ships of the Belgian Relief Committee, any seeming concession which the Germans may make is not likely to have more value than that made on any other scrap of paper. In all probability, the true inwardness of this notice lies in the fact that the enemy are once more about to attempt a campaign of the utmost intensiveness. It may be deemed a warning that they are again about to put forth their full strength with every available submarine. It may show also that this attempt will be carried out further into the Atlantic, with the result, of course, that the crews of the ships which fall a victim to it will stand a poor chance of reaching land in their boats, even if they are not accorded the inhuman treatment expressed in the policy "sink without a trace."—*Army and Navy Gazette*, 14/12.

BRITAIN SHOCKED BY NAVAL REVERSE.—The successful attack by German warships on a convoy in the North Sea resulting in the sinking of 14 vessels, as announced in the House of Commons December 17, came as an uncomfortable surprise to the British public. It is expected to cause a revival of the serious criticism of the Admiralty such as at the time of the successful German attack on a convoy of Scandinavian merchantmen in October.

Added to this is the raid made off the Tyne last Wednesday by German warships. As a result of these two expeditions one British destroyer has been sunk, another seriously damaged, five trawlers and eight merchantmen have been sent to the bottom, another trawler has been damaged and a number of men have been killed, wounded or taken prisoner. Among the prisoners is a nephew of Viscount Grey, former foreign secretary.

According to the Danish accounts, the force which attacked the convoy consisted of four cruisers, in addition to destroyers. A painful aspect of the affair, from the British public's point of view, is that apparently all the

attacking vessels escaped and returned to their bases. Another unpleasant feature is that the British cruiser squadron detailed to protect the convoy against surface attacks for some unexplained reason was not on the scene. Vice Admiral Beatty immediately opened an inquiry, and the first sitting was held December 23, being conducted by Vice Admirals Sturdee, de Robeck and Goodenough. The investigation will be hastened as much as possible.

According to the testimony of survivors both here and in Scandinavia, the fighting was of most violent character. The Germans poured hundreds of shots into the ill-fated vessels.

Testimony given at the inquest over the victims of the German attack on the British convoy shows that the attack occurred between 4 and 5 o'clock on the morning of December 12 and that the enemy destroyers fired as rapidly as possible for a few minutes. A Swedish steamer was torpedoed twice, the second torpedo cutting the vessel completely in two. Of the crew of 20 hands on board it 16 were either killed or are missing.

No assistance was rendered by the enemy boats. British destroyers came upon the scene and rescued the survivors.

The merchant vessels were being convoyed by the destroyers *Partridge* and *Pelew*. The *Partridge* was sunk and the *Pelew* was damaged.

Sir Eric Geddes said the circumstances of the attack, so far as available, were that the *Partridge* sighted four enemy destroyers shortly before noon, and, with the *Pelew*, engaged them, while the convoy scattered. The *Partridge* was hit heavily. Shortly afterward an explosion occurred aboard and she sank. The *Pelew* was pierced at the water line and her engines were disabled, but eventually she was brought safely to port. The enemy then attacked the convoy sinking the merchantmen and armed trawlers.

The entire crew of the trawler *Lord Alveston* was saved in one of its own boats. The casualties on the *Pelew* were one officer and three men killed and two wounded seriously. Information regarding the crew of the *Partridge*, Sir Eric said, was incomplete, but a report from Kiel told of the taking there of three officers and 21 men from the *Partridge* and of one officer and 25 men from the trawlers.

Eighty-eight Scandinavians, two of whom are women, and 10 British were rescued by four British destroyers detached from a cruiser squadron which was hastened to the scene. Other survivors reached Norway in boats.

German Official Report.—The following official communication was issued December 14, dealing with German naval attacks on commercial traffic off the east coast of England and in the North Sea last Wednesday:

"Simultaneously with an attack on commercial traffic on the English east coast our light forces on December 12 under command of Lieut. Captain Hans Kolbe, again attacked a convoy.

"The convoy consisting of six steamers totaling 8000 tons, including an armed English steamer, the torpedo-boat destroyer *Partridge* and four armed vessels, were destroyed in battle. The English destroyer *Pelew* escaped damaged.

"Our forces returned without losses and with a large number of prisoners, including four officers."—*Washington Star*, 18/12.

NOBODY TO BLAME FOR CONVOY DISASTER.—In the House of Commons today Sir Eric Geddes, First Lord of the Admiralty, made this statement concerning the attack by German warships on a convoy in the North Sea December 12, in which one British and five neutral merchantment, a British torpedo-boat destroyer, and four armed trawlers were sunk:

"The Admiralty finds that the escorting vessels did their best to protect the convoy and were fought in a proper and seamanlike manner, and that other forces at sea for the purpose of protecting took all possible steps to come to their assistance and prevent the escape of the enemy.

"It is due to Vice Admiral Sir David Beatty, commander of the Grand fleet, to say that the Admiralty finds the circumstances which prevented covering forces from behind reaching the spot were such as could not be prevented and that the commander-in-chief's dispositions were the best that could have been made with the forces available."—*N. Y. Times*, 15/1.

ARMED BRITISH SHIP SUNK BY SUBMARINE.—The British armed steamship *Stephen Furness* has been torpedoed and sunk by a German submarine in the Irish Channel, it was officially announced December 22. Six officers and 95 men were lost.

The *Stephen Furness* was a merchantman of 1712 tons gross, built in 1910 at West Hartlepool, and owned by the Tyne Tees Shipping Company, Ltd., of Newcastle. She was one of the many merchantmen that have been refitted by the Admiralty for naval uses.—*N. Y. Herald*, 23/12.

"U-53" CAPTURED.—The *U-53*, the German submarine which visited Newport over a year ago and then sank several ships off Nantucket, has been captured by the French.

The U-boat was taken by a French destroyer and two minesweepers. The big submersible is now in allied service and has accounted for several enemy submarines, which, recognizing her lines as Hamburg-built, approach her without fear, as the *U-53* usually runs awash.—*Baltimore News*, 28/12.

ZEPPELIN DROPS INTO SEA.—A Zeppelin and a seaplane which was accompanying it have been wrecked in the North Sea, according to a *Central News* dispatch from Copenhagen, quoting advices received there from West Jutland.

The Zeppelin is said to have fallen in flames to the sea.—*Washington Post*, 30/12.

THREE BRITISH SHIPS LOST.—Three British torpedo-boat destroyers were sunk through being struck by torpedoes or hitting mines off the Dutch coast on the right of December 22, with the loss of 13 officers and 180 men, the Admiralty announced December 29. The text of the statement reads:

"Three of our destroyers were mined or torpedoed during foggy weather off the Dutch coast on the night of the 22d of December. A total of 13 officers and 180 men were lost."

Whether correctly or not, the supercession of Admiral Sir John Jellicoe as First Sea Lord is popularly believed to have been the direct sequel of the loss of the three destroyers. This incident has been generally known here, although only just announced officially.

The First Lord of the Admiralty, Sir Eric Geddes, went several days ago to Sandringham, where the royal family is staying for the holidays. He was received in audience by the King on Christmas, which indicated that the business was unusually urgent. The Admiralty changes were announced the next day.—*N. Y. Times*, 30/12.

BRITISH DESTROYER LOST WITH ALL HANDS.—The British destroyer *Racoon* struck rocks off the Irish coast on Wednesday and foundered, it is announced officially. All on board were lost. The text of the statement issued by the Admiralty says:

H. M. S. *Racoon*, Lieutenant George Napier in command, struck on the rocks off the north coast of Ireland at two o'clock in the morning during a snowstorm, and subsequently foundered with all hands.

Nine of the crew had been left behind at her last port of call, and these are the sole survivors. Seventeen bodies have been picked up by patrol craft and are being buried at Rathmullen. Five more bodies were washed ashore, and they are being buried locally.

The *Racoon* was built in 1910. She was 266 feet long and displaced 915 tons. She was armed with one 4-inch and three 3-inch guns, and two torpedo tubes. Her normal complement was 105 men.—*N. Y. Times,* 13/1.

BRITISH LOSE TWO DESTROYERS IN GALE.—The British Admiralty announces the loss of two torpedo-boat destroyers in a violent gale and a heavy snowstorm last Saturday night. The vessels ran ashore on the Scotch coast and were wrecked and all hands on board were lost, except one man.—*N. Y. Herald,* 18/1.

FRENCH MERCHANT SHIP FIGHTS.—An inquiry was made into the conditions in which encounters have taken place between French merchantmen and enemy submarines between January 1 and August 1, 1917. It is stated that the French ships were successful in 106 of these encounters. In 34 cases success was due to maneuvering, and in 62 to the use of artillery. In 13 cases it was not the submarine which began the fight. There were even occasions when merchant vessels chased their enemy. In three cases the French vessels escaped by beaching. On June 5 the French steamship *Diane* was sunk by an enemy submarine in the English Channel.—*Journal United Service Institute,* November.

HOSPITAL SHIP TORPEDOED; ALL OF WOUNDED SAVED; THREE SAILORS MISSING.—The hospital ship *Rewa* was torpedoed and sunk in the Bristol Channel on January 4, while on her way from Gibraltar, it is announced officially.

All the wounded were rescued.

There were three casualties among the crew.

"His Majesty's hospital ship *Rewa* was torpedoed and sunk in the Bristol Channel at about midnight on January 4 on her way home from Gibraltar. All the wounded were safely transferred to patrol vessels. There were only three casualties among the crew, three Lascars being missing.

"She was displaying all the lights and markings required by The Hague convention. She was not and had not been within the so-called barred zone, as delimited in the statement issued by the German Government on January 19, 1917."

After making several charges of the misuse of hospital ships, which were denied specifically by the Entente Governments concerned, the Germans last year suspended the immunity of these vessels in the English Channel and certain other waters.

The British discontinued special markings of hospital ships, on the ground that they were merely rendered conspicuous thereby and were more liable to attack. Last September King Alfonso of Spain intervened and succeeded in obtaining an agreement from the belligerents for the free movement of hospital ships within specified areas.

The British steamship *Rewa* is of 7308 tons gross and 456 feet long. She was built in 1906 and owned in Glasgow and has been in the service of the British Government.

The Bristol Channel is an arm of the Atlantic extending into the southwestern part of Great Britain between Wales and the southwestern counties of England.—*Baltimore News,* 9/1.

AN INTERESTING PRECEDENT.—German denials of the torpedoing of the hospital ship *Rewa* serve as a reminder of that famous *Sussex* denial, fortified by the submarine commander's drawing. Only last week Germany agreed to pay a large sum of money by way of indemnity to the family of a Spaniard who lost his life on the torpedoed *Sussex.* That was an interesting admission of Germany's guilt.—*N. Y. Herald,* 14/1.

A GERMAN WARSHIP BOMBARDS YARMOUTH.—Yarmouth was bombarded from the sea last night, it is announced officially; about 20 shells fell in the

city. Three persons were killed and 10 injured. The enemy craft presumably was a submarine or a light cruiser. The bombardment, which was preceded by illumination of the town by large star shells, continued about eight minutes. The inhabitants were taken completely by surprise.

Owing to the blackness of the night the enemy was not seen. He fired 20 to 25 shells in rapid succession. Many windows were shattered and a number of roofs and chimneys were wrecked.

Most of the inhabitants were in bed at the time of the attack. One of the three persons killed was a sailor aboard ship, who had escaped submarines in midocean. The other two were killed in the street. There were many narrow escapes among the occupants of the damaged houses.

Attacks by German naval forces on English coast towns, of which there were a number early in the war, have been infrequent in recent months. The last previous occurrence of the kind officially reported was on September 4 of last year. On that day a German submarine bombarded Scarborough, causing the death of three persons and the injury of five.

Yarmouth is on the North Sea 115 miles northeast of London. It is a city of some 50,000 inhabitants, with important shipbuilding and fishing industries.—*Baltimore American*, 16/1.

BALTIC

TWO HUNDRED AEROPLANES WOULD HAVE ENABLED THE RUSSIANS TO CHECK THE GERMANS AND PREVENT CAPTURE OF STRATEGICAL BASES IN THE GULF OF RIGA.—Once more Russia has suffered defeat through her lack of aircraft. In 1914-1915 Russia suffered great losses because she did not have a hundred or so additional air scouts to direct the movements of the Russian forces and warn them of the movements of the Germans.

Russia's recent losses and her inability to check the Germans in the naval operations which resulted in the Germans capturing the important Islands of Dago and Oesel and resulted in the loss of the large Russian dreadnought *Slava* was due more than anything else to the lack of 200 additional fighting aeroplanes with which to defeat the German Zeppelins and aeroplanes which directed the operations of the German forces.

Had they been able to maintain their aerial supremacy, the Russians could have prevented the blockade of the Gulf of Riga and Moon Sound and the landing of troops on the Dago, Oesel, Runo and Moon islands which resulted in the capture of 10,000 Russian troops and 50 cannons.

It was known that the Russians had only a handful of aviators to protect the group of Baltic Islands which lies between the Gulf of Finland and the Gulf of Riga, off the Esthonian coast. That they fought the German aerial forces was shown by the reports which stated that two German aviators were shot down.

The aerial engagements between the German and Russian aerial forces preceded the naval engagement. It took place on the northern coast of the Island of Dago, to which the Germans came from the open sea. Having disposed of the few Russian aviators, the German naval forces could operate unhindered, using their Zeppelins and aeroplanes to direct their ships which located the entrance to the Moon Sound, protecting the ships from British and Russian submarine attacks. The blockade of the entrance to the Moon Sound between Dago Island and Oesel Island, which was supposed to be well fortified, seems to have taken effect without any fighting.

The next step of the Germans was to force the entrance to the Gulf of Riga to the south of the Oesel Island. Ever since the Germans captured Libau, the important Russian naval base on the Baltic, it was obvious that their next step would be to attempt the forcing of the entrance to the Gulf of Riga. The Russians are known to have mined the entrance to the Gulf and to have blocked it by dumping into it every available material. But the Germans seem to have succeeded in sweeping the mines and clearing the channel.

There were no engagements at the entrance of the Gulf. The Russian fleet moved to Moon Sound, the plan being to seek protection in the Gulf of Finland. The German fleet checked it and during the engagement the Russian ship the *Slava* was sunk at the southern entrance of the Moon Sound, the German guns outranking the Russian guns and four German seaplanes participating in the attack.

The Germans seemed to feel sure that they had bottled up the Russian fleet and proceeded to bombard the islands and to land troops on the Oesel and Dago islands. On October 15 they captured Arensburg, the main city of Oesel Island, and isolated a Russian force in the extreme south of the island. The escape of the Russian fleet seems to have been made possible by the laxity of the German air forces at night.

The German operations from the start were directed by Zeppelins and aeroplanes. It was an easy task because the area of danger from Russian and British submarines was small, extending only to the entrance of the Gulf of Finland and the entrance between the Oesel Island and the mainland. It is evident from the fact that the Germans landed their troops on the Karsar Bay side and from the Gulf side of the Oesel Island that they expected submarine attacks. Therefore, they selected as a landing place for the troops the places which could best be protected from the Russian and English submarines.

One hundred fast fight planes and 100 large torpedoplanes and bombing aeroplanes could have protected these important Russian positions better than their many cannons and warships. The fast fighting machines would have kept the sky clear of German aeroplanes and the torpedoplanes and the bomb dropping machines could have inflicted tremendous damage on the German fleet, sunk the transports and torpedo-boats and damaged even the largest ships. At all events, they could have prevented the carrying out of operations by their continuous attacks on them.

There is little doubt that the best thing that the United States and the Allies can do to help Russia is to supply her with aeroplanes and aviators in large number, and to begin to conduct aerial operations against German military and naval bases from the Russian side, thereby keeping tens of thousands of Germans busy protecting their bases on the Russian fronts, and preventing the concentration of their forces elsewhere.—*Aviation.*

THIRTY-EIGHT OFFICERS SLAIN IN U-BOAT MUTINY.—A mutiny among submarine crews at the German naval base of Kiel, on January 7, is reported in an Exchange Telegraph dispatch from Geneva. Thirty-eight officers are said to have been killed.

The Geneva dispatch quotes advices received there from Basel, giving details concerning the mutiny. It is said to have been begun by submarine crews, and subsequently to have spread to portions of the crews of cruisers stationed at Kiel.

Some of the men who joined in the attack on the officers took part in the earlier mutiny at Kiel, the dispatch reports. It adds:

"Although the mutiny was local, it shows that German naval men are dissatisfied, especially in the submarine service, as the number of boats returning to German ports is decreasing every month."—*Evening Star,* 17/1.

MEDITERRANEAN

SUBMARINE IS SUNK FOLLOWING ATTACK.—A statement by the Ministry of Marine concerning the sinking of the old French cruiser *Chateau Renault* says that the warship, with several other vessels, was attacked by a submarine in the Ionian Sea at 7.15 o'clock on the morning of December 14. Continuing, the statement says:

"The torpedo struck on the starboard side in the region of the stokehold, which it flooded, and at the same time bursting steam pipes which stopped the engines.

"The captain at once manned the hand steering gear and steered so as to utilize the momentum of the ship and approach the shore, which was in sight. Passengers and the crew were ordered to their boat stations at the sound of the explosion. Torpedo-boat destroyers, which formed a part of the convoy, dashed in the direction from which the torpedo had come and volleyed shells at the spot where it was presumed the submarine had submerged.

"While the boats were being lowered from the *Chateau Renault*, the enemy submarine came up on her left. The cruiser had sunk to her gun ports, but nevertheless the gun crews remained at their posts and opened a hot fire on the submarine, which promptly dived. A second torpedo was fired shortly after and struck the *Chateau Renault* on the starboard side forward. She sank by the head a few minutes after the captain got aboard a patrol boat. All passengers were saved, but 10 members of the crew are missing and are supposed to have been killed by the explosion.

"The torpedo-boat destroyers, overloaded with survivors, renewed the attack on the submarine under water and then on the surface when she appeared for an instant, only to submerge again precipitately under fire of the guns of the destroyers. Two seaplanes then bombed her. The submarine probably had been struck by a shell so as to make it impossible for her to remain submerged, for she appeared once again and was immediately covered by a rain of shells.

"One of her gunners was swept overboard by a shell while in the act of aiming his piece, and all the others jumped into the sea, while the submarine sank like a stone torn to pieces by French guns. The prisoners number 22, among them the captain of the submarine and two officers."

The French cruiser *Chateau Renault* was laid down in 1896. She was 442 feet long, with a beam of 55.7 feet and displaced 7898 tons. Her complement before the war was 600 men. Besides being used as a cruiser formerly, the *Chateau Renault* had been fitted as a mine-layer.—*Washington Star*, 23/12.

AMERICAN SHIP "SURAGA" HIT BY TORPEDO.—The American steamship *Suraga*, a vessel of 4374 tons gross register, and owned by the New York and Oriental Steamship Company, was torpedoed and compelled to run ashore on December 27, while in Mediterranean waters, according to a report received in New York, January 8, in insurance circles.

The *Suraga* left New York the latter part of October for an Italian port and it is understood that she was returning and bound for a French port when torpedoed. So far as can be learned all of her crew are safe.—*Washington Star*, 5/1.

JAPANESE SAVE CONVOY.—*Warships Drive off Hostile U-boats in the Mediterranean.*—Enemy submarines which attempted to attack British transports convoyed by Japanese warships in the Mediterranean on December 30 were repulsed, says an announcement from the Japanese admiralty.

The warships were not damaged.—*Washington Post*, 6/1.

BRITISH DESTROYER TORPEDOED.—London, January 7.—A British torpedo-boat destroyer has been torpedoed and sunk in the Mediterranean Sea, according to an Admiralty announcement.

All the officers of the destroyer were saved, but 10 members of the crew were lost.—*Baltimore American*, 9/1.

ITALIAN SHIP SUNK.—*Practically New Steamer Torpedoed by U-boat.*—The big Italian steamship *Milazzo*, 11,477 tons gross register, was sunk during the early part of December by a German submarine while the ship was in Mediterranean waters, according to word received in New York shipping circles January 10. It is understood no lives were lost.

The vessel was practically new, having been launched in 1916, and while originally intended for passenger as well as freight traffic, was employed entirely for freight. She was owned by the Navigazione Generale Italiana, and was last reported in American waters the latter part of September, 1916. At that time she arrived with a damaged propeller, which was caused, it was understood, by an encounter with a U-boat. On her return voyage with a cargo of cotton she caught fire and had to put into Fayal. The fire was extinguished, and after a delay of about two weeks she proceeded on her voyage. The *Milazzo* was 492 feet long with a beam of 65 feet.—*Baltimore American*, 10/1.

ADRIATIC

THE WAR IN THE ADRIATIC.—By a British Naval Officer.—In the Adriatic where, from the beginning of the war, there has been naval co-operation of a very marked kind, the allied fleets have been performing some fine work in connection with the defence of the Piave line. The British monitors, which had been affording the Italians valuable assistance in their advance towards Trieste, are now rendering help in the great struggle against the Austro-German invasion. General Diaz, in an order of the day of November 21, referred to the valuable co-operation of the National Navy and the British monitors in the coastal zone. In a semi-official note also reference was made to the work accomplished by the navies of the allied powers when the right wing of the Italian Army was falling back. Much precious war material was saved, and when the enemy torpedo-craft appeared on the scene they were at once driven off with loss. It was, indeed, suggested at one time that, hoping to take advantage of the situation, the Austrian fleet was putting to sea, but this was denied afterwards, and was, indeed, unlikely, in view of the overwhelming superiority in naval strength of the Allies in the Adriatic. Among the unfortunate results of the occurrences on land may be counted the withdrawal of the threat to Pola given by the advance of the Italians, and which it was anticipated and hoped might force the Austro-Hungarian fleet to leave port. There can, of course, be no question that the loss of Monfalcone and the menace to Venice has deprived the Italians of useful naval bases in the Upper Adriatic, and at the same time has encouraged the Austrian seamen to attempt enterprises which were previously quite beyond their power. It is some time since any attempt on the Italian coast railway has been undertaken, and when a squadron of light craft made their appearance between Porto Corsini and Pesaro towards the end of last month the reception they received from the naval armored trains on the railway forced them to retire. An excellent description of these armored trains with the Italians, with illustrations, was given in Chapter CLXXXIX of the "*Times* History and Encyclopædia of the War." They are an adjunct of the navy which appears to have most adequately fulfilled its purpose. The last report concerning allied naval activity at the mouth of the Piave River was most encouraging. In an official *communiqué* it was stated that on the coastal area a British monitor obtained a direct hit on and interrupted a bridge of boats which the enemy had thrown across the river in the vicinity of Passarella, some 10 miles from the sea. Almost daily, said the military critic of the *Corriere della Serra*, the pontoon bridges which span the river in the neighborhood of Passarella are destroyed by the guns of the British monitors, but the enemy reconstructs them during the night. Mr. G. Ward Price, the correspondent of the *Times*, writing from Venice, mentions the monitor which destroyed the bridge at a range of 18,000 yards as the *Picton*, appropriately named after a British general. He says that at this range there were three bridges across the river 200 yards apart, and on these the monitor's guns put five direct hits out of seven shots. The first shot was on the target, and the pontoon bridges were each hit at either end, one of them being so effectively cut in two that the aeroplane observer reported that the middle

part of it floated away down stream. Another shell was dropped right into the third bridge, an old one made of stone, which the Austrians had repaired. This is a well-deserved tribute to the fine shooting of the bluejackets in the monitor, and also to the spotting of the observer in the aeroplane.—*Army and Navy Gazette*, 8/12.

ITALIANS ENTER TRIESTE HARBOR IN DARING RAID.—Two Italian torpedo-boats, under Lieutenant Commander Rizzo, composed the force which made the daring raid into the inner harbor at Trieste on Sunday night, December 9, and torpedoed two Austrian battleships, one of which was seen to sink. Further details of the exploit were received in dispatches by the Italian Embassy.

The raid was arranged when it was learned that the Austrians were preparing to send from Trieste two vessels of the *Monarch* type, with their 240-millimeter guns, to bombard the Italian coastal positions. A division of torpedo-boats, under Captain Pignatti, was assigned to the task, and the captain selected Lieutenant Commander Rizzo with two boats to make the dash into the harbor, while the remainder of the division kept outside in support.

By slow and silent movement through a heavy fog the little craft reached the extremity of the Muggia Pier, where the officers examined the disposition of the numerous obstructions which barred the passage. Mine fields and other obstructions were located, and two hours were spent cutting eight large wire cables stretched across the passage. Other obstructions were weighted and sunk sufficiently to permit the boats to pass over them.

During all this time Austrian outposts were very near and searchlights were being played on the water, but in spite of this the torpedo-boats succeeded in entering the inner port without being sighted.

Two Austrian battleships were discovered at anchor at the further end of the harbor near Point Sabba. Proceeding cautiously, the Italian vessels approached to ascertain whether there were any protecting nets or other obstructions, then took up positions for the attack.

Finally at half-past two in the morning of December 10 the two torpedo-boats simultaneously launched four torpedoes aimed at the battleships. All four torpedoes exploded. Rizzo reported that the battleship *Wien*, nearest the attacking vessels, was observed to sink in five minutes, while the other battleship certainly was struck, though owing to the great distance it was impossible to discover the damage done.

At the sound of the explosions Austrian batteries opened fire and searchlights swept over the waters. The lights located the attacking vessels and the Austrian guns were brought to bear on them and torpedoes fired, but the Italians escaped and returned safely to base with the supporting squadron.—*N. Y. Herald*, 18/12.

CZECHS GAVE UP WARSHIP.—The Slav Press Bureau makes public a dispatch from Geneva which says:

"The *Pesti Hirlap* of November 21 publishes a number of sensational revelations that were made in the Hungarian Parliament by the Magyar Deputy, Mr. Fenyes. Among these is an interpellation which is addressed to the Hungarian Cabinet in regard to the fate of the Austrain torpedo-boat No. 11, whose personnel consisted of Austrian officers and Czech marines. Deputy Fenyes said: 'Before the Italian offensive the boat left the harbor of Cattaro in order to meet an incoming German submarine and convoy it through the minefields into the harbor. The torpedo-boat never reached its place of destination, however, and the German submarine waited in vain. For two weeks nothing was heard of the whereabouts of this torpedo-boat until the publication of a report by the Stefani Agency stating that it arrived safely in the Italian harbor of Brindisi. The report further stated that while they were on the way to meet the incoming submarine the Czech marines on board the vessel revolted, fettered their Ger-

man and Magyar officers, and steered the torpedo-boat into the Italian harbor.'

"This report is another evidence of the fact that the Czechoslovaks are determined to shake off the tryannous yoke of the House of Hapsburg, and that they will not desist in their opposition until complete independence is secured."—*N. Y. Times*, 30/12.

BLACK SEA

In the Black Sea our torpedo-boats *Pylkyi* and *Bystryi*, dispatched under the command of Captain Count Keller to destroy the Turkish steamer damaged by one of our submarines, discovered an enemy torpedo-boat and two steamers in Inda Bay. The enemy torpedo-boat was sunk and the two steamers were burnt.—*United Service Gazette.*

BRITISH BATTLEPLANE'S 2000-MILE FLIGHT TO BOMB CONSTANTINOPLE.—For the first time the amazing story of a British battle-aeroplane's flight to Constantinople from London, and its sequel in the bombardment of the German headquarters and the Turkish war office there, was told yesterday by Mr. Handley Page, and Mr. Basil Johnson, whose firm, the Rolls-Royce, Ltd., built the engines that flew the 2000 miles without a hitch.

Loading up at Hendon, the machine which with spares and luggage was more than six tons in weight, proceeded to Paris, Lyons, and to avoid the Alps, continued by way of Marseilles. From Marseilles the journey was by way of Spezzia to Risa, Rome, Naples and Otranto, which was the last point over friendly country. The next, and perhaps the most difficult stage of the journey, was over the Albanian Alps to Saloniki, a trip of 250 miles across mountains varying from 8000 to 10,000 feet, with no suitable place for landing in case of need.

Squadron Commander Savory, who was the chief pilot, told him, said Mr. Handley Page, that they could see wild Bulgarian horsemen below. who were running about in every direction, waiting for a chance to kill them if they came down.

From Saloniki the adventurous party flew to their base, overhauled the machine, and prepared for a long distance bombing expedition to Constantinople, a distance of about 320 miles.

On their attacking trip they set forth with 16 bombs, and on arriving at the Sea of Marmora throttled down from 2000 feet to 1600 feet, the Golden Horn and other points being clearly in view.

After a short survey of the lights of Constantinople, and in order to make sure of their objectives, they came down to 800 feet and dropped a salvo of four bombs, hoping to reach the *Goeben*, which was anchored just beneath them. Unfortunately they missed the vessel, but managed to hit one or two submarines that were lying alongside her.

Turning on their track they made another attempt on the *Goeben*, and this time, in spite of the attentions of a number of Turkish and German anti-aircraft guns, managed to plank four bombs on the battleship.

Then they flew up to a ship called the *General*, which was the headquarters of the German staff, and dropped two bombs on her, to the great consternation of naval and military officers assembled in her saloons.

One more target, too tempting to be missed, attracted the intrepid aviators, and they next made their way to that part of the town where the Turkish War Office was situated, and dropped two more of their bombs on the building. The Turkish official report on the latter incident quaintly minimized matters by saying "The war office was not destroyed."

After half an hour's bombing of Constantinople they turned around and started back to their base, Flight Commander McLellan relieving his chief in the steering. They had not escaped without damage, but even after one engine had been put out of action they were able to get away without serious damage from the "band accompaniment" of guns below, which had paid them a quite uncomfortable amount of attention.

On arriving back at the base no fewer than 26 bullet holes were found in the machine. The journey to Constantinople and back (640 miles) occupied seven hours.

Handley Page said Engineer Lieutenant Rawlings, who was one of the party, reported that they had no trouble at all with the engines, although the water in the radiator boiled as on a very hot day. He thought the flight, which constituted a world record for British aeroplanes, engines and aviators, showed the great possibilities of aerial long distance bombing expeditions during the war, and also that there were great possibilities for mail and freight carrying in times of peace.—*Washington Post*, 6/1.

GERMAN ADMIRAL HEADS BLACK SEA COMMISSION.—The Russo-German Commission which has gone to Odessa to discuss questions concerning the Black Sea has arranged a meeting for consideration of conditions under which interned civilians may be repatriated. The commission consists of 18 delegates, under the presidency of a German admiral. The chief Russian delegate is a sailor from the Black Sea fleet.—*N. Y. Herald*, 14/1.

BOLSHEVIKI SAILORS MASSACRE 60 OFFICERS OF BLACK SEA FLEET.—A terrible massacre of Russian naval officers of the Black Sea fleet by Bolsheviki sailors was reported from Sebastopol, January 14. At least 60 officers, four of them admirals, were said to have been slain during a two days' orgy of bloodshed.

A general was taken from the garrison and executed when he attempted to have loyal troops interfere. All of the officers of one ship were taken to Malakoff Tower and shot. The streets were littered with corpses of officers and men shot down in the fighting.—*Baltimore American*, 16/1.

TURKEY VIOLATES ARMISTICE.—Turkey has violated the armistice signed between the Central Powers and Russia, according to word received at Petrograd, January 14. The Ottoman commander, it was stated, had landed 20,000 troops between Trebizond and Rize and a Turkish submarine was reported to have sunk a Russian transport.—*Baltimore American*, 14/1.

UNITED STATES ARMY

BUSH TERMINAL, WITH BIG PIERS, TAKEN BY ARMY.—The Bush Terminal, comprising 20 city blocks, between Thirty-ninth and Fifty-first streets, Brooklyn, with 3100 feet of continuous water front, facing a 40-foot government channel, was requisitioned by the War Department yesterday.

The eight piers, each one-quarter of a mile in length, and the 120 warehouses will be used as a base for the Quartermaster's Department, United States Army.

The order for seizure of the terminal was issued in Washington, being practically the first official act of Major General Goethals, the new acting quartermaster general.

Word was at once telegraphed to Irving T. Bush, president, who last night informed a reporter for the *Herald* that every effort will be made by his working staff to assist the army in its operation of the terminal. He said between 2000 and 3000 employees will be affected immediately, and if the 20 miles of railroad and the industrial buildings are later commandeered a much larger force will pass under the control of the War Department.

Mr. Bush has been chief executive officer of the War Port Board since that organization was formed. He has just been notified he is appointed to a new post, that of Director of Harbor and Terminal Facilities of the Embarkation Service, United States Army. He will work in conjunction with Brigadier General Shanks, Military Commander of the Port of Embarkation in Hoboken. Mr. Bush said he regrets very much to see a business that it took 25 years to build up pass so quickly from his hands. He is very glad, however, to render assistance to the United States, he

insisted to a *Herald* reporter, and therefore willingly gives up the industries if his properties can be of use to the government.

At present the piers of the Bush Terminal are used by a score of steamship lines. One of these piers, with 15 acres of floor space, is used by the Russian Volunteer Fleet and other shipping companies of the Russian government. For months it has been practically idle, although millions of dollars' worth of supplies, ordnance and general merchandise are piled there. What to do with it is a problem—now to be settled by the United States Army.

Other steamship lines which must vacate are the Royal Belgium Line, the American-Hawaiian Steamship Company, the Austro-American Line (American agents have pier contracts), the Prince Line, Hansa Line, Norton Line, Bucknall Steamship Lines, Levant Line, American-African Line, Royal Dutch West India Mail, American and Australian Line and several others.

According to Moody's Manual, industrial section for 1917, the gross earnings of the Bush Terminal Company in 1916 were $1,955,237, and the operating expenses and taxes amounted to but $745,811. The real estate and improvements were valued December 31, 1916, at $13,437,383, and the total assets then amounted to $21,890,738.

Need for the proper protection of the Bush terminals has been recognized for several months by the War Department. An armed guard is maintained and sentries challenge everp yerson who approaches unless certain instructions are followed. From time to time the terminal has been used for loading of supply vessels with cargoes for the government, the Red Cross and Belgian relief. It is expected that ample time will be given all holding leases to find new docking space.—*N. Y. Herald*, 1/1.

THE AMERICAN ARMY which is to be sent into battle to make the world safe for democracy is rapidly being formed. In the nine months since the United States declared that a state of war existed with Germany the army has risen from 212,034 officers and men to 1,539,506 officers and men.

This statement has been made by Secretary of War Baker, who declared that no other army in the history of the world had ever been raised, equipped or trained so quickly.

The Secretary added that a "substantial" force of Americans already was in France and fit for active service, and that full equipment is on hand for every man who will be sent to Europe during 1918.

On the fighting fronts the infantry is inactive, except for small raiding operations, but the artillery duels continue intense on various sectors.—*Baltimore American*, 10/1.

ENEMY AIRPLANES DROP BULLETS AND BOMBS.—Enemy air raiders are showing an increased interest in the American aviation centers, especially those nearest the lines.

During one of the most recent incursions the German airplanes descended within 250 feet of the ground, endeavoring to make sure that the several bombs which they dropped should hit their targets, which in most cases were buildings in which men were billeted. Luckily, the German aim, even at such close range, was poor, for no Americans were killed.

Another German machine which flew over the position later dropped a bomb from a higher altitude at a hangar. The bomb missed its mark, but dug a great hole in the adjoining field.

Spray of Bullets on Position.—At a certain place nearby an enemy squadron descended within 300 feet of the earth and sprayed an anti-aircraft machine gun position with a hail of bullets, but did not hit any of the gunners, all of whom were French.

The Americans at the most advanced aviation camp have found a novel mounting for the machine gun used for defence against enemy airplanes. When the guns for the newly dug pits arrived it was discovered that only

field carriages had been provided. These were unsuitable for aircraft defence work, so swivels were constructed from old motor truck springs. These improvised mounts are said to be as good as any used.

Worst Conditions Yet Experienced.—Icy roads turned into river beds, for torrential streams flowing from the melting snows on the hills, together with a downpour of fine rain, combined to make conditions the worst the American Army has experienced since crossing to France.

Through the zone of the army is was not infrequent to find the roads at places lined on either side with motor trucks which had been ditched. Mule-driven vehicles also were mired in many cases. In one stretch of road a mile long there were 14 vehicles ditched at night with the soldiers working hard to release them. The mule-drawn transport trains, indeed, suffered the most from the conditions, the animals slipping on the icy road beds and being unable to arise after falling until branches and twigs cut from trees were put under their feet.—*Washington Evening Star,* 16/1.

GOETHALS AS ACTING QUARTERMASTER GENERAL.—Reorganization of the War Department, begun with the creation last month of the War Council of high general officers, advanced a step further, January 7, with the appointment by Secretary Baker of Major General George Goethals, acting quartermaster general, to serve also as director of War Department transportation and storage. Wide economies in the use of cars and in shipping charges are expected from this centralization in one agency of functions heretofore exercised by five departmental bureaus independently.

Behind the announcement stands the probability that army purchasing also will be drawn together under a central control. Steps to this end are under consideration, but legislation may be required to carry it out. The question of finding a man for the job, however, already has been taken up. Some officers think the duty should be placed under the General Staff, but others believe a separate office should be created, to be filled by a civilian of national reputation for business ability. It is practically certain, however, that should a civilian be appointed he would be commissioned as a general officer, subject to all army law.

General Goethals, as acting quartermaster general, directs the supply, subsistence and pay departments of the army, supplemented by the embarkation and other services already established in his office, each with a general officer in charge. Under to-day's order he will, in addition, supervise transportation of all ordnance, engineer, signal corps, aviation service and coast artillery material, as well as quartermaster supplies and troops.

All bureaus heretofore independent in this regard have been directed to co-ordinate their demands upon the railroads and upon storage facilities through the director of transportation. He, in turn, will deal with the director of the railroads, the Shipping Board, or any other centralized agency for transportation or storage, presenting complete schedules of cars and tonnage needed, and working out routing and storage so as to get the most efficient use of the nation's facilities.—*Baltimore American,* 8/1.

AMERICAN FLIER DOWNS GERMAN AERO AT FRONT.—The former captain of the Princeton football team, now serving in the flying corps, brought down his first German plane, January 5, says the European edition of the *New York Herald.*—*Washington Evening Star,* 9/1.

DIFFICULT TO TRANSFER TO UNCLE SAM'S FORCES.—The Associated Press has received information that the American War Department has decided on rules governing the transfer of Americans serving with the British forces to the American Army, by which their present status will not be disturbed except in special cases, and where the transfer "is plainly in the interests of the United States."

This decision, it is said, was reached on the following grounds:

First, that Americans who enlisted with the British forces must have been prompted by patriotic motives to do so and that therefore it does not

matter whether they remain British or are transferred to their own flag, since they would be fighting for the same cause.

Second, in some cases, particularly with the Canadians, many of whom are Americans, transfers might seriously disorganize units.

Americans in Canadian Forces.—While no official statistics are available, it is fair to guess that there are at least from 25,000 to 30,000 Americans in the Canadian forces alone, and perhaps half as many more scattered through other British contingents in France, Mesopotamia, Palestine, and elsewhere. Hundreds of letters have been sent to the American authorities in London begging for transfer, but the authorities say they are unable to make concession to any special number of men without taking over the men as a whole.

In many instances, it is pointed out, the desires for transfers are not prompted by patriotism, but because of the chance to enjoy greater benefits and the higher pay of the American forces. The authorities argue that if in the first instance the men joined the British Army "to fight for principle," the principle is not changed if they remain with the British forces. Hence it has been decided that an officer in the British Army, who is an American and desires a transfer, must apply to the embassy in London, which will be guided in the premises by instructions from the War Department at Washington.

Hard to Obtain Transfer.—The rules adopted say that "it will not be the general policy of the War Department to request the release of an American holding a commission in a foreign service." Regarding enlisted men, the new rules say that release will only be considered of applicants who present themselves personally to the military attaché of the American embassy in London "with satisfactory documentary evidence of citizenship," and that the military attaché "may then, in special cases, ask for release." The rules add: "When so released, me nare to proceed to France at their own expense and report for enlistment in our service to the headquarters of the American expeditionary force."

The rules provide that an enlisted man must also procure from the commander of his unit of the British forces a written recommendation that the commander regards his transfer to the American forces "in the interest of the United States."—*Washington Evening Star,* 5/1.

SAFEGUARD MUNITION SHIPS.—The danger of destruction in New York City by the explosion of a munition ship, such as occurred at Halifax, is being done away with by the adoption of new routes for handling such ships and new points for loading their barges and lighters, it was announced by government officials.

The new plan was worked out by the War Board of the Port of New York and army engineers. The menace to South Brooklyn, now present while munition ships are loaded in Gravesend Bay, is to be ended by moving the ships to a point where, even if an explosion did occur, the destruction on land would be comparatively slight. The ships will hereafter be loaded at a point too distant to endanger any part of the city. The route of barges and lighters carrying munitions on the bay has been fixed so that Manhattan Island and Brooklyn are said to be almost entirely free from danger, while no important points on the New Jersey shore of the bay are greatly menaced.—*N. Y. Times,* 10/1.

GENERAL NOTES

WHY GERMANY IS LOSING THE WAR.—Germany is the backbone of the Central Powers' military organization. Shatter her, and the whole fabric of the enemy's opposition falls to the ground. Because of this fact, France, Great Britain, and now the United States have massed their strength in France and Flanders. For the same reason Germany has maintained in

France and Flanders two-thirds of her total forces. To-day she has practically the whole of her armies—or what is left of them—on the western front and in Italy.

How may Germany be beaten?

In the early days of the war, when her armies were at their full strength, it was believed that the breakdown would come within her borders. We all remember the familiar predictions of 1915 and 1916. She was to suffer financial collapse; lacking cotton, nitre and copper, she would be unable to munition her vast armies; lacking food, she would starve.

Yet, to-day, with the fourth year of the war half spent, the German people are not starving for food; her armies are not starving for munitions; nor is she bankrupt, not at least in the eyes of her own people.

But, as year after year of the war passed by, it began to be realized that there was yet another menace to German success; a menace purely military in nature, remorseless in its approach, and absolutely fatal when it arrived—the menace of a shortage of man-power.

To-day, among all military men and among those civilians who have managed to maintain a true perspective of this vast war, it is known that the backbone of German resistance will be broken when the wastage of man-power—rifle-bearing man-power—has reached the point where it is no longer possible to man the battle front in sufficient strength to hold back the enemy.

This wastage and the ultimate arrival at the point of man-exhaustion are a mere question of mathematics—of addition and subtraction; the result is as certain as that water will not run up hill, or that the whole is greater than its part.

Of the four great necessities referred to, failure of any one of which would bring Germany down, the first three may be likened to a constantly-flowing river—the last to a reservoir of definite capacity. There is a certain amount of uncertainty as regards the first three—but the last, unless Germany can gain an early military decision, spells her certain and hopeless defeat.

You may carry the bucket to the stream as often as you like; but dip your bucket in the cistern too often and one day you shall find it dry.

To no one are these facts so well known as to the German staff; and no part of the German propaganda has been so cleverly handled as that which is designed to camouflage that human cistern, the contents of which have been drained away so swiftly as the war has run its course.

"Look at the map," cries von Hollweg.

"Look at the cistern," we answer; and with our eyes on that annual loss of one and a quarter million German fighting men who will never again shoulder a rifle, we care very little whether the blood-letting be done a little to the east or a little to the west of a line traced on a map.

As to the bankruptcy of Germany it can never happen so long as the Kaiser has a printing press to turn out a cataract of paper-money, and the German citizen is content to accept the output at its face value.

Nor will Germany fail to supply all the munitions that her rapidly-dwindling armies can use. She can dig coal and iron ore from her mines and coax nitrogen from the atmosphere for guns, shells and explosives—and keep on doing it indefinitely. The Serbian mines and the kitchen of the *hausfrau* will give their yield of copper. The stream will flow in sufficiency as long as the war shall last.

Food? There is enough arable land within the battle-lines to raise sufficient food to keep the citizen alive and provide a special ration for the man at the front.

Men? Before this war, military writers, the Germans included, told us that the proportion of the population in any country that could be made into fighting men was 10 per cent. The population of Germany is 68,000,000. As a matter of the fact the mobilization has reached nearly 15 per cent.

and therefore in August, 1914, the potential fighting strength of Germany was about 9,500,000 men.

This was the reservoir from which the human material would have to be fed to the fighting lines. The nine and one-half million fighting men could never be affected by the birth rate—not unless the war should run for 18 years. The only supply available to offset the outflow was the physically efficient young men, some 450,000 who would reach the age of 18 each year. Unlike the question of paper money, or munitions or food, there is no process by which men can be printed in a printing press or fabricated in smelter, rolling mill and lathe. Nor can you dig up fighting men from the ground, like potatoes.

And not even the German chemists could make a substitute for human flesh and blood—though they probably dreamed even of that.

So there it stood at the beginning of the war, a cistern full to the brim with 9,500,000 men with a potential annual inflow of 450,000.

Now let us see what has been the rate of loss. There are two ways in which we may get at the facts: first the German official statements; second, the estimates made by the Allied Military Intelligence Departments (secret-service). And we find that these arrive at the same total loss—dead and hopelessly crippled—of about 5,000,000 men.

For the first two years Germany gave out official figures—doctored of course. But the Allies, through their secret-service agents in Germany, gathered the true figures by tabulating the notices sent to the relatives of the dead, and recorded on the roll of honor of churches, clubs, labor unions, etc. This revealed that about 1,150,000 men had been killed or taken prisoners, and reckoning the hopelessly crippled at 1,350,000 men, which is about the ratio of cripples to dead as determined in this war, we get a loss of 2,500,000 in the first two years and a total loss of about 5,000,000 men by August, 1918.

General Maurice, replying recently to General Ludendorf's statement that the British in making their slight gains in Flanders, this year, had lost 500,000 men, stated that they had never that number engaged on the sector in question. He stated, further, that they had accurate knowledge that the German losses had been 75 per cent greater than those of the British.

There is nothing surprising in this statement. Not only have the British a great superiority in gunfire—as have the French—with superior observation by aeroplane, but the Germans have frequently made a dozen or more counter attacks in close order during the furious fighting on the Somme and before Ypres. Their losses must necessarily be enormous.

Now the British losses as officially reported have been running as high as 30,000 a week. Eighty per cent of these, at least, or 24,000, must have occurred on the western front. During the winter months the losses have averaged about 10,000 per week. This gives an average for the year of 17,000 per week on this front.

Increasing this by 75 per cent gives a German loss on the British front of 29,750 per week.

Their losses to the French at such battles as the Marne, Champagne, Verdun, the Chemin-des-Dames, cannot be less—they may indeed be more.

The terrific fighting on the Russian front coupled with the Serbian, Roumanian and Italian drives may readily have resulted in average casualties of say 26,000 per week among the Germans.

The total average casualties on all fronts then would reach 85,500 per week. This would mean a total of 4,446,000 casualties in one year.

Now at the ratio of five wounded to one dead this would give a total of 741,000 dead per year.

The Germans have made some fantastic claims as to the number of wounded that are returned to full active service—claims of well over 90 per cent. If 76 per cent are so far restored that they can carry a rifle and endure the frightful ordeal of trench fighting it would a notable result. Assuming 76 per cent so restored, we find that of the wounded, 889,200 are permanently crippled and rendered unfit.

But there is yet another leak in this cistern of man-power, which curiously is always overlooked. We refer to the fact that soldiers die from sickness as well as civilians. Our census of 1910 shows that the average death rate between the ages of 20 and 45 is about eight per thousand. The damp conditions of trench life, coupled with the extraordinary mental strain of modern warfare, will raise the rate above that of American civilian life, especially as undeveloped boys of 16 years and men up to 45 years of age are found in the German army. Assuming a rate of 10 per thousand, the loss through sickness would reach 68,000 per year. This figure would probably be maintained, because though the total army has decreased the quality of the troops has greatly deteriorated.

A summary of these totals for killed, permanently crippled, and dead through sickness, gives a yearly total of 1,698,200 men absolutely lost. To compensate for this Germany calls to the colors each year about 450,000 young men; not 600,000, which is a figure they give out for public consumption. The total annual loss therefore is 1,248,200. And if this rate be maintained until August, 1918, the total net loss will be 4,992,800 or say 5,000,000 men.

This it will be noted agrees with the total loss, as determined by the allied secret-service from the official notifications made by the government to the relatives of soldiers lost at the front.

Therefore we repeat, "Look at the cistern, not at the map."—*Scientific American*, 15/12.

BIG KRUPP PLANT AT ESSEN ABLAZE.—Workmen from Essen, Germany, say that the Krupp plant, the great German munitions establishment, has been ablaze for 24 hours.

The plant at Essen, the main establishment of the Krupps, the largest manufacturers in Germany of arms and munitions, employed about 30,000 men before the war. It has been expanded greatly during the war. Facts relating to its present size and the number of workmen are kept secret by the German Government. It was reported unofficially in October of last year that about 70,000 persons, including several thousand women, were at work there and that 20,000 were to be added to the force.

Early this year there was a strike at the Krupp works, said to have been due to lack of food. It was reported that 40,000 workers were involved and that the authorities combatted it by sending many of the men to the front, but little authentic information was permitted to come out of Germany.

Essen is in Rhenish Prussia about 40 miles from the Dutch border. Few places in Germany are guarded more carefully. No persons unknown to the German authorities are permitted to go to the town. The plant has been raided several times by French and British airmen, notwithstanding its formidable anti-aircraft defences. Press dispatches last July said 100 persons there had been killed in a raid by French airplanes and that considerable damage had been done to the works.

Krupps Quadruple Their Navy Plant.—The Krupps recently have quadrupled their naval plant near Kiel, according to a dispatch from Berlin by way of Berne to *La Suisse*. This was done at the request of the Gergan Government for the purpose of making up losses in submarines, which, the dispatch adds, have been heavier than the German Admiralty admits.—*N. Y. Herald*, 23/12.

GIVE PAROLE INSTEAD OF BECOMING PRISONERS.—Commanders of German submarines now usually require the captains of merchant ships to give their parole instead of making them prisoners as heretofore, according to the annual report of the London-America Trading Company, a large British shipping concern. When men are paroled they cannot re-enter the merchant marine during the war. The companies employing them give them half pay until they obtain other employment.

"We have several ship captains in our employ who have sunk more than one German submarine, and a good many of our ships have had scraps with the enemy the past year," says the report. "Some have come home with holes in their funnels or sides, and others have failed to return. But when a ship has been torpedoed and gone down, the survivors hurry back to the offices of the firm, make a hasty report and then ask cheerily, 'When is the next ship to be ready?' That is the spirit of the mercantile marine."—*Washington Star*, 28/12.

TORPEDO MAKER HELD AS TRAITOR.—Paul Hennig, a German-born American citizen, for many years a petty officer in the Imperial German Navy, and who for the last five years has been foreman of the gyroscope department of the E. W. Bliss Torpedo Company in Brooklyn, was indicted on Friday as a traitor to the United States by a federal grand jury of the Eastern District of New York. The indictment is the first to be returned in New York City for treason since Congress declared war on Germany, and in the event of conviction the death penalty may be imposed. The offence charged is that Hennig tampered with the delicate gyroscope mechanisms in such a way as to render the torpedoes to which they were fitted imperfect, if not useless, after being discharged from the torpedo tubes of an American destroyer or submarine.

Hennig is about 43 years of age, and has been in the United States since 1908. Prior to coming to this country he was, according to the federal authorities, for a long period on duty at the German torpedo base at Kiel. He is described as a man of fine education and as an expert in everything that pertains to gyroscopes, particularly such as are used at the present time to control the movement of torpedoes after they are fired and while they are speeding toward their mark. He is himself the inventor of a gyroscopic attachment for torpedoes, which, it was said, has considerable merit.

It was stated in the Brooklyn Federal Building that about 90 Germans had been taken out of the Bliss Company works in the last few weeks. More than 80 enemy aliens who had been employed since war was declared in the Bliss works are now in internment camps. One of the men taken from the works several weeks ago was Karl Hennig, the 23-year-old son of the man indicted as a traitor on Friday. He was born in Germany of a German mother and came to this country with his father in 1908.—*N. Y. Times*, 30/12.

BRITISH PRISONERS HELD BY THE ENEMY total 46,712, of which 2257 are officers and 44,455 enlisted men. These prisoners include members of the regular army, territorial forces, Royal Navy and navy division.—*N-Ac Log*, 10/1.

GERMANY RUSHING MEN TO WESTERN FRONT.—The Berlin *Vossische Zeitung* states that Field Marshal von Hindenburg and General von Ludendorff arrived in Berlin Saturday morning, apparently for a new Crown Council. An official statement adds that the Crown Prince was also in Berlin and was received Saturday morning by the Kaiser.

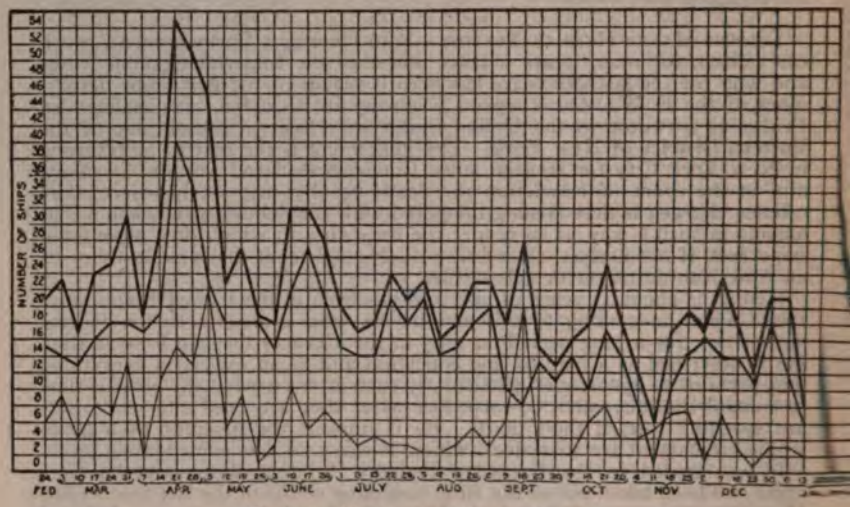
This journey of the Crown Prince to Berlin appears sudden, as he was at Aix-la-Chapelle Friday night, according to a prisoner's statement, apparently intending to await the arrival of German repatriated prisoners.

In some quarters to-night it is suggested that the Crown Council is connected with the expected western offensive. Attention is drawn to the fact that German troop trains are still running westward day and night. Only thoroughly fit men are carried through, weaklings or men showing any sign of unfitness being dropped at Red Cross stations on the way.—*N. Y. Times*, 18/1.

GERMANS DESTROY VILLAGES, MOSTLY NEAR ST. QUENTIN, AS A DEFENSIVE MEASURE.—The Rome correspondent of the *Matin* says that by order of Field Marshal von Hindenburg, according to reliable information which

has reached him, 130 villages behind the western front, mostly in the region of St. Quentin, have been leveled to the ground, so as to afford better oportunity for defence of the German lines to the rear.

Notwithstanding denials, the correspondent adds, only one-third of the 300,000 Belgians deported to Germany have been permitted to return to their homes.—*Evening Star*, 9/1.



BRITISH MERCHANT SHIPS SUNK.

Heavy Line.—Total.
Medium Line.—Over 1600 tons.
Light Line.—Under 1600 tons.

LOSS OF MERCHANT TONNAGE.—According to figures supplied by the Patriotic Education Society, Inc., Washington, D. C., the loss of world's tonnage up to September, 1917, actually amounted to 12,000,000 tons, although the destruction by submarine and mine was only 8,783,080 tons. This is figured by estimating the unusual depreciation due to the exigencies of war and including the ships that are held in port, as well as the falling off in the world's tonnage. If the war had not intervened, it is estimated that the world tonnage in 1917 would have been about 59,000,000 gross tons.—*Marine Engineering*.

DESTRUCTION OF BIG CHEMICAL PLANT STAGGERING MILITARY BLOW TO KAISER.—From a well-informed source the *Daily Telegraph* has received interesting particulars of the great explosion of November 22, by which the large chemical factory of Griesheim-Elektron, near Frankfort, was destroyed. No details were obtainable at that time, and no great attention was paid to the report in this country, no doubt from desire to avoid exaggeration of what might, after all, prove to have been an affair of no great importance. But the extreme care taken to prevent fuller accounts from getting out of Germany and the enforced silence of the German press on the subject, are the best proof of the German Government's anxiety to conceal a serious loss.

The first telegram to escape from Frankfort made a significant admission which the subsequent silence only confirms. It announced that the excite-

ment in Frankfort caused by the explosion was tremendous. Information which has since been obtained makes it clear that there was good reason for excitement.

Like Military Defeat.—For it is now certain that the explosion caused the complete destruction of one of the greatest munitions factories in the world, by which Germany has suffered a disaster comparable to a serious military defeat in its effect on the issue of the war.

Under these circumstances it is a matter of supreme interest to understand precisely to what extent German military equipment was dependent on the source of supply which was wiped out.

The Griesheim factory was situated in the neighborhood of Frankfort, with an extensive frontage on the River Main. It consisted of an enormous group of buildings covering an area of more than 54 acres. Twenty-eight large chimneys, one of them higher than 200 feet, gave the impression more of an industrial town than a single factory, and numerous piers abutting on the river, combined with an extensive railway system, enabled the huge concern to distribute its product economically and quickly. Before the war it ranked as fourth in importance of the great German chemical works, and was always a flourishing company, paying a pre-war dividend of 14 per cent, and worth as a going concern more than 60,000,000 marks (£3,000,000).

Great Munitions Plant.—Its commanding position in the chemical world rested not only on its huge output but on the extensive variety of its manufactures. These comprised, among other things, aniline dyes of every description, nitric, sulphuric and other acids, phosphorus and alkali, with liquid chlorine, hydrogen and oxygen, as important by-products. What it meant to Germany as a source of munitions of war can thus be readily understood.

As one of the uncommon instances among German chemical works possessing installations of electro-chemical production, it was of prime importance as a source of synthetic nitrates, and its splendidly organized research laboratory enabled it to play a leading part in the production of poison gas and the other more refined forms of "frightfulness" which Germany has introduced in the course of the war. That the Imperial Government has taken the fullest advantage of these facilities is shown by the rapid increase of the works both in extent and output since the beginning of the war, and by the fact that the company has recently decided to increase its share capital by 50 per cent, an increase in which the German Government is more than suspected of having a financial interest.

Supplied Explosives Factories.—With regard to the productive capacity of Griesheim, some authoritative facts are available which cast an interesting light on the war activities of this concern. It has been producing saltpetre for the manufacture of black powders at the rate of 1000 tons a day, and it is reputed to be the only factory turning out this article. To such an extent has its already impressive output of soda nitrate and concentrated sulphuric acid been developed, that it supplied the whole demand of five nitroglycerin and dynamite factories, as well as two powder works, including that of Rottweil, one of the most important in Germany. Another explosive, which it manufactured in large quantities, was tontine, through its facilities for making synthetic phenol and consequently picric acid, from which acid this explosive is derived.

Another circumstance of special interest to us is the fact that this factory supplied large quantities of electrolytic hydrogen for the inflation of Zeppelins, and possessed by way of a reserve gasometers with a total capacity of more than 300,000 cubic feet. So important was it in this respect that a Zeppelin shed, usually containing two or three airships, was erected close to the works. For the balloons at the front the gas was supplied in steel tubes in the liquefied state.

Made Poison Gases.—Moreover, the extensive electrolytic plant was further utilized to produce asphyxiating gas, and lachrymatory and poisonous shells. Indeed, it was the greatest center of this manufacture in Ger-

many, and in 1916 the output of poison gases reached the colossal figure of nearly 900,000 cubic feet a day.

The extent of the material loss which Germany has suffered by the destruction of the Griesheim factory can thus be easily comprehended. But the disaster is of still wider significance. The variety of the materials formerly produced means, in such a closely interlocking industry as chemical manufacture, that every concern in Germany is affected, both from the cutting off of supplies, which many of them formerly drew from Griesheim, and from the necessity of making the loss of those supplies good from plants already working to their maximum.

The deaths of scores of trained workmen and specialists in the factory itself and in the dwellings within its confines will make the task of coping with the deficit all the more difficult. Even if the material loss can be successfully replaced, the problem of collecting miscellaneous quantities of explosives and acids from various quarters and conveying them over the greater distances thus made necessary is bound to complicate further the transport difficulty already regarded exceedingly pressing in Germany. It is impossible that the works can be reconstructed during the war, and sooner or later Germany must show on her fighting fronts the effects of this staggering blow which she has suffered within her own territory.—*Washington Post*, 6/1.

WAR RATIONING IN ENGLAND.—The cablegram of January 6 from Lord Rhondda describing the food situation in both England and France as "critical and anxious," seems to be at variance with what he said in an address at Silverton three days earlier: "There is nothing alarming in the situation. You have only to tighten your belt. The people of this country are undergoing nothing like the privations in Germany. There they have less than a pound of meat a week." It will not do to jump to the conclusion that the British Food Controller was an alarmist in the one case and an optimist in the other. His cablegram to Mr. Hoover reflects a belief that lean days are coming for the people of the British Isles; the speech at Silverton, if read between the lines, has very much the same significance; in both, compulsory rationing is declared to be necessary.

The policy of restricting and regulating the consumption of food will be entered upon with reluctance, for in Germany the authorities will seize upon British rationing as evidence of greater privation than the German people are called upon to endure, and the appeal will be made to tighten the belt a little more to win the war. It will be said exultantly that the British have been reduced to extremity by the success of the submarine campaign. The truth is that while foods, particularly meat, are none too plentiful in Great Britain and France and prices are high and advancing, want as the people of Germany and Austria know it does not exist. In France the cost of living has increased 100 per cent since the beginning of the war, and prices are now about double those prevailing in New York for eggs, butter, mutton, bacon and pork, and rice. Canned goods are scarce and higher. Potatoes and milk sell for about the prices asked here. In England foods are a little cheaper than in Paris.

For whatever shortage exists in Great Britain the people are in part to blame. They have been urged again and again to economize, but the response has not been what the government expected. The workers have been earning much higher wages in munition making and other war industries than they received before the war; and the truth is they have lived high, for them. There has been more sacrifice in the middle class than among the artisans and unskilled laborers. Probably from every point of view the gentry and aristocracy have made the most sacrifices in their habits of life as well as in money contributions to the war. The British people cannot eat their cake and have it. So compulsory rationing has become inevitable. Lord Rhondda sees "long queues of people waiting in

severe weather in practically every town in England for the necessaries of life."

At the same time the ration plan is not to be comprehensive all at once, which means that the tight belt is for the present a figure of speech. First, meat will be conserved and given out in portions; then the turn of butter and margarine will come; and periodically, if the situation does not improve, other necessaries will be added to the list. As a matter of fact, compulsory rationing, as contrived by Lord Rhondda, is a long look ahead. The American people will be shortsighted if they do not read a lesson from the regulated subsistence to which the British are now to be reduced because they failed to take the warnings of their Food Controller seriously.—*N. Y. Times*, 8/1.

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DIPLOMATIC NOTES

FROM DECEMBER 18 TO JANUARY 18

PREPARED BY

ALLAN WESTCOTT, PH. D., Instructor, U. S. Naval Academy

RUSSO-GERMAN PEACE NEGOTIATIONS

FIRST MEETING AT BREST-LITOVSK.—On December 23 representatives of the Central Powers and the Bolshevist Government in Russia met at Brest-Litovsk to negotiate peace. The delegates were as follows:

Germany: Dr. Richard von Kühlmann, Foreign Minister; Herr von Rosenberg, Baron Von Hock, General Hoffmann, and Major Brinckmann.

Austria-Hungary: Count Czernin, Foreign Minister; Herr von Merey, Freiherr von Wisser, Count Collerda, Count Osaky, Field Marshal von Chisceries, Lieutenant Polarny, and Major Von Gluise.

Bulgaria: Minister Popoff, Former Secretary Cosseff, Postmaster General Stoyanovich, Colonel Gantjiff, and Dr. Anastasoff.

Turkey: Former Minister of Foregn Affairs Nessimy Bey, Ambassador Hakki, Under Foreign Secretary Hekmit Bey, and General Zekki Pasha.

Russia: Joffe Kamineff, Bisenko Pokrosky, Karaghan Lubinski, Weltman Pawlowich, Admiral Altvater, General Tumorrl, Colonel Rokki, Colonel Zeplett, and Captain Lipsky.

Prince Leopold of Bavaria, as Commander-in-Chief of the German forces in the east, welcomed the delegates and invited Hakki Pasha, as the senior delegate, to open the conference. Hakki Pasha, after an expression of a desire for a satisfactory result, declared the negotiations formally open, and proposed Dr. von Kühlmann as the presiding officer. The German Foreign Minister was unanimously elected chairman.

The German Foreign Minister proposed the following rules, which were adopted:

"Questions of precedence will be decided according to the alphabetical list of the represented powers.

"Plenary sittings will be presided over by the chief representative of each of the five powers in rotation.

"The following languages may be used in the debate: German, Bulgarian, Russian, and Turkish.

"Questions interesting only part of the represented powers may be discussed separately.

"Official reports of the proceedings will be drafted jointly."

At von Kühlmann's suggestion the chief Russian delegate stated the chief principles of the Russian peace program in a long speech, which coincided on the whole with the well-known resolutions of the Workmen's and Soldier's Deputies.

The delegates of the Central Powers declared their readiness to begin the examination of the Russian program. The result of their labors will be discussed at the next sitting.

COUNT CZERNIN'S TERMS FOR GENERAL PEACE.—On December 25 Count Czernin, speaking for the Central Powers, offered a statement of terms involving no "forcible annexations" and no indemnities. Since the Central Powers stipulated a general acceptance of these terms on the part of

Russia's allies, the Russian delegates requested a 10-day recess to consider the terms and present them to the Western Powers. Count Czernin's statement was as follows:

The delegations of the allied (Teutonic) powers, acting upon the clearly expressed will of their governments and peoples, will conclude as soon as possible a general peace. The delegations, in complete accord with the repeatedly expressed viewpoint of their governments, think that the basic principles of the Russian delegation can be made the basis of such a peace.

The delegations of the Quadruple Alliance are agreed immediately to conclude a general peace without forcible annexations and indemnities. They share the view of the Russian delegation, which condemns the continuation of the war purely for aims of conquest.

The statesmen of the allied (Teutonic) governments in programs and statements have emphasized time and again that for the sake of conquest they will not prolong the war a single day. The governments of the allies unswervingly have followed this view all the time. They solemnly declare their resolve immediately to sign terms of peace which will stop this war on the above terms, equally just to all belligerents without exception.

It is necessary, however, to indicate most clearly that the proposals of the Russian delegation could be realized only in case all the powers participating in the war obligate themselves scrupulously to adhere to the terms, in common with all peoples.

The powers of the Quadruple Alliance now negotiating with Russia cannot, of course, one-sidedly bind themselves to such terms, not having the guarantee that Russia's allies will recognize and carry out these terms honestly without reservation with regard to the Quadruple Alliance. Starting upon these principles, and regarding the six clauses proposed by the Russian delegation as a basis of negotiations, the following must be stated:

CLAUSE 1. Forcible annexations of territories seized during the war does not enter into the intention of the allied powers. About troops now occupy-seized territories, it must be stipulated in the peace treaty, if there is no agreement before, regarding the evacuation of these places.

CLAUSE 2. It is not the intention of the allies to deprive of political independence those nations which lost it during the war.

CLAUSE 3. The question of subjection to that or the other country of those nationalities who have not political independence cannot, in the opinion of the powers of the Quadruple Alliance, be solved internationally. In this case it must be solved by each government, together with its peoples, in a manner established by the constitution.

CLAUSE 4. Likewise, in accordance with the declaration of statesmen of the Quadruple Alliance, the protection of the rights of minorities constitutes an essential component part of the constitutional rights of peoples to self-determination. The allied governments also grant validity to this principle everywhere, in so far as it is practically realizable.

CLAUSE 5. The allied powers have frequently emphasized the possibility that both sides might renounce not only indemnification for war costs, but also indemnification for war damages. In these circumstances every belligerent power would have only to make indemnification for expenditures for its nationals who have become prisoners of war, as well as for damage done in its own territory by illegal acts of force committed against civilian nationals belonging to the enemy. The Russian Government's proposal for the creation of a special fund for this purpose could be taken into consideration only if the other belligerent powers were to join in the peace negotiations within a suitable period.

CLAUSE 6. Of the four allied powers, Germany alone possesses colonies. On the part of the German delegation, in full accord with the Russian proposals regarding that, the following is declared:

The return of colonial territories forcibly seized during the war constitutes an essential part of the German demands, which Germany cannot

renounce under any circumstances. Likewise, the Russian demand for immediate evacuation of territories occupied by an adversary conforms to German intentions. Having in view the nature of the colonial territories of Germany, the realization of the right of self-determination, besides the above outlined considerations, in the form proposed by the Russian delegation is at present practically impossible.

The circumstance that in the German colonies the natives, notwithstanding the greatest difficulties and the improbability of victory in a struggle against an adversary many times stronger and who had the advantage of unlimited import by sea, remained in the gravest circumstances faithful to their German friends, may serve as proof of their attachment and their resolve by all means to preserve allegiance to Germany, proof which by its significance and weight is far superior to any expression of popular will.

The principles of economic relations proposed by the Russian delegation in connection with the above six clauses are approved wholly by the delegations of the allied powers, who always have denied any economic restrictions, and who see in the re-establishment of regulated economic relations which are in accord with the interests of all people concerned, one of the most important conditions for bringing about friendly relations between the powers now engaged in war.

GERMANY'S SPECIFIC TERMS.—On returning from Brest-Litovsk on January 1 the Russian delegation presented the specific terms of the Central Powers as given at the conference. Russia objected to these terms chiefly on the ground that, according to Article I, Germany refused to evacuate Riga, Libau, and other parts of Russia until all elements in Russia had accepted the treaty; and that, as stated in Article II, Germany refused to move troops from Poland, Lithuania, Courland, and portions of Esthonia and Livonia, and considered that as these territories had already declared for independence, no further vote was necessary. The German terms were in substance as follows:

ARTICLE I. Russia and Germany are to declare the state of war at an end. Both nations are resolved to live together in the future in peace and friendship on condition of complete reciprocity. Germany will be ready as soon as peace is concluded with Russia and the demobilization of the Russian armies has been accomplished to evacuate her present positions in occupied Russian territory, in so far as no different inferences result from Article II.

ARTICLE II. The Russian Government, having, in accordance with its principles, proclaimed for all peoples, without exception, living within the Russian Empire, the right of self-determination, including complete reparation, takes cognizance of the decisions expressing the will of people demanding a full state of independence and separation from the Russian Empire for Poland, Lithuania, Courland, and portions of Esthonia and Livonia. The Russian Government recognizes that in the present circumstances these manifestations must be regarded as an expression of the will of the people, and is ready to draw conclusions therefrom. As in these districts to which the foregoing stipulations apply, the question of evacuation is not such as provided for in Article I, a special commission shall discuss and fix the time and other details in conformity and in accordance with the Russian idea of the necessary ratification by a plebiscite on broad lines and without any military pressure whatever of the already existing proclamation of separation.

ARTICLE III. Treaties and agreements in force before the war are to become effective if not directly in conflict with changes resulting from the war. Each party obligates itself, within three months after the signing of the peace treaty, to inform the other which of the treaties and agreements will not again become effective.

ARTICLE IV. Each of the contracting parties will not discriminate against the subjects, merchant ships or goods of the other parties.

ARTICLE V. The parties agree that with the conclusion of peace economic war shall cease. During the time necessary for the restoration of relations there may be limitations upon trade, but the regulations as to imports are not to be of a too burdensome extent and high taxes or duties upon imports shall not be levied. For the interchange of goods an organization shall be effected by mixed commissions to be formed as soon as possible.

ARTICLE VI. Instead of the commercial treaty of navigation of 1894-1904, which is abrogated, a new treaty will accord new conditions.

ARTICLE VII. The parties will grant one another during at least 20 years the rights of the most favored nation in questions of commerce and navigation. [This clause is apparently that carried in a German wireless message received in London and sent by cable on December 31.]

ARTICLE VIII. Russia agrees that the administration of the mouth of the Danube be intrusted to a European Danube commission, with a membership from the countries bordering upon the Danube and the Black Sea. Above Braila the administration is to be in the hands of the countries bordering the river.

ARTICLE IX. Military laws limiting the private rights of Germans in Russia and of Russians in Germany are abolished.

ARTICLE X. The contracting parties are not to demand payment of war expenditures, nor for damages suffered during the war, this provision including requisitions.

ARTICLE XI. Each party is to pay for damage done within its own limits during the war by acts against international law with regard to the subjects of other parties, in particular, their diplomatic and consular representatives, as affecting their life, health or property. The amount is to be fixed by mixed commissions with neutral chairmen.

ARTICLE XII. Prisoners of war who are invalids are to be immediately repatriated. The exchange of other prisoners is to be made as soon as possible, the times to be fixed by a German-Russian commission.

ARTICLE XIII. Civilian subjects interned or exiled are to be immediately released and sent home without cost to them.

ARTICLE XIV. Russian subjects of German descent, particularly German colonists, may within 10 years emigrate to Germany, with the right to liquidate or transfer their property.

ARTICLE XV. Merchantmen of any of the contracting parties which were in ports of any other party at the beginning of the war, and also vessels taken as prizes which have not yet been adjudged, are to be returned, or if that be impossible, to be paid for.

ARTICLE XVI. Diplomatic and consular relations are to be resumed as soon as possible.

NEGOTIATIONS RENEWED.—On January 3 Count von Hertling announced to the Reichstag that Dr. von Kühlmann had been instructed to reject Russia's proposal to transfer the conference to Stockholm, on the ground of difficulty of telegraphic communication with the capitals of the nations engaged and danger of interference from Russia's allies. Concerning Russia's rejection of the proposals relating to occupied territories, the Chancellor said: "We can cheerfully await the further course of this incident; we rely on our strong position, our loyal intentions, and our just rights." The decision to reject the Stockholm proposal was approved on January 4 by all parties in the Reichstag Main Committee save the Radical Socialists.

Sessions were renewed at Brest-Litovsk on January 8. Owing to failure of Russia's allies to take favorable action Germany withdrew the terms

offered in Count Czernin's statement of December 25. Dispatches of January 15 stated that the armistice had been extended to February 18, and that the peace conference had been adjourned to be continued later. In the session of January 11 difficulty arose over the Russian request that deported Poles and Lithuanians should be allowed to return, and that imprisoned Czechs and Bohemians in Austria should be liberated.

GERMAN PEACE ENVOYS HOLD DIVERGENT VIEWS.—Arthur Ransome, the Petrograd correspondent of *The Daily News*, sends the following under date of January 3:

"From a source which has hitherto proved reliable I learn the following suggestive details concerning the peace negotiations. Two perfectly distinct tendencies were noticeable in the enemy delegation, one annexationist, represented by General Hoffmann, the other more moderate, represented by Dr. von Kühlmann and Count Czernin. There were frequent disputes between these two tendencies, settled in each case by an appeal to Berlin. Berlin, without exception, supported Czernin and Kühlmann. Hoffmann takes a purely military view, and more than once complained with great bitterness of the Russian use of the armistice to agitate among the German soldiers."—*N. Y. Times*, 5/1.

SEPARATE PEACE WITH BULGARIA.—London, January 10.—A separate peace agreement has been signed by Russia and Bulgaria, according to the *Bund* of Berne, a dispatch from the Swiss capital reports. A Bulgarian correspondent says Premier Radoslavoff read the following dispatch from Brest-Litovsk in Parliament:

"War between Russia and Bulgaria ceases. Diplomatic and economic relations between Russia and Bulgaria are resumed. Russia recognizes Bulgaria's right to nominate a delegate to an international Danube commission. The first peace is thus concluded, with the consent of Bulgaria's allies."

Separate peace proposals made by Turkey have been refused by the Bolshevist Government, according to a report in Petrograd. Turkey was requested to participate in the general conference between Russia and the Central Powers.

A dispatch of January 5, from Petrograd, purported to give the Turkish peace terms as presented to Russia. Among the terms proposed by Turkey were free passage of the Dardanelles for Russian ships, Russian evacuation of Turkish territory, and demobilization of the Russian Black Sea fleet. Turkey was to retain her active army in consequence of continuation of war against the Entente.

Bulgaria took part with Germany, Austria, and Turkey in the first negotiations at Brest-Litovsk, and it has been assumed that no peace terms would be agreed to by the Central Powers except in concert. However, advices yesterday giving the names of those who took part in the first session of the Brest-Litovsk conferences when they were resumed this week made no mention of a Bulgarian representative.—*N. Y. Times*, 11/1.

INTERNAL CONDITIONS IN RUSSIA.—In December General Kaledine was re-elected leader of the Don Cossacks by a vote of 562 out of a total of 638. Reports to Petrograd from Kostov on January 10 announced the formation of the Republic of the Don with General Kaledine as President and Prime Minister. The territory included comprised more than 63,000 square miles in the Don basin in southeastern Russia. The purpose of General Kaledine was said to be not to fight the Bolsheviki but to end civil war.

According to Petrograd dispatches of January 6, the Rada, the Ukrainian legislative body, and the Bolsheviki had agreed to a compromise, by which the Ukraine agreed to withdraw support from General Kaledine and

his Cossacks in return for the removal of Bolshevist troops from Ukraine territory. Later reports stated that abundant food supplies had been secured for Petrograd through this settlement, the Ukraine agreeing to supply three billion pounds of bread within 60 days on payment half in cash and half in merchandise.

A Ukrainian delegate was admitted to the peace conference at Brest-Litovsk and submitted the following statement:

"The Ukrainian People's Republic brings the following to the knowledge of all belligerents and neutral states: The Central Rada, on November 20, proclaimed a People's Republic, and by this act an international status was determined. Striving for the creation of a confederation of all the republics which have arisen in the territory of the former Russian Empire, the Ukrainian People's Republic, through its General Secretariat, proceeds to enter into the independent relations pending the formation of a federal government in Russia and until the relations of the Ukraine with the future federation are established."

It was later announced that Germany and the Ukrainian Government had negotiated peace independently from the Bolshevist delegates.

FINLAND AND UKRAINE RECOGNIZED.—Germany announced, on January 6, that she recognized Finland as a republic. The Paris *Matin* stated on January 6 that France had recognized Finland as an independent state, and that a high commissioner had been sent to Kiev by the Allies to deal with the Ukraine. This action was taken "to assist each region to attain a form of government which in future shall assure the durable existence of the Russian federation."

CONSTITUENT ASSEMBLY DISSOLVED.—A Reuter's dispatch of January 20 stated that the Bolsheviki had dissolved the Constituent Assembly, which held its opening session January 18. At this session the anti-Bolshevik element succeeded in electing their candidate for chairman by a vote of 244 to 151. The Bolsheviki and extreme Social Revolutionists thereupon withdrew from the Assembly.

PEACE TERMS OF THE ALLIES.

PREMIER LLOYD GEORGE TO TRADES UNION CONFERENCE.—On January 5 Premier Lloyd George, speaking for the government and the nation before the Trades Union Conference in London, stated in the plainest language the essential peace terms demanded by the Allies.

Two weeks earlier, on December 20, the Premier had addressed the House of Commons on the same theme. In this earlier speech he made a favorable report on the shipping and submarine situation, stating that whereas available ship tonnage was "down about 20 per cent, imports had decreased in volume only 6 per cent." Reviewing the military situation, he called attention to successes in Palestine, the aid of America, and the difficulties created by the Russo-German armistice. He forecast further levies on man power, to be drawn from young men hitherto held in essential industries. Re-stating peace terms, he declared that Russia's interests were out of the hands of the Allies, and that German colonies would not be restored.

habited by Europeans. The governing consideration, therefore, must be that the inhabitants should be placed under the control of an administration acceptable to themselves, one of whose main purposes will be to prevent their exploitation for the benefit of European capitalists or governments.

"The natives live in their various tribal organizations under chiefs and councils who are competent to consult and speak for their tribes and members and thus to represent their wishes and interests in regard to their disposal. The general principle of national self-determination is, therefore as applicable in their cases as in those of the occupied European territories.

"The German declaration that the natives of the German colonies have through their military fidelity in war shown their attachment and resolve under all circumstances to remain with Germany is applicable, not to the German colonies generally, but only to one of them; and in that case, German East Africa, the German authorities secured the attachment, not of the native population as a whole, which is and remains profoundly anti-German, but only of a small warlike class, from whom their *askaris*, or soldiers, were selected. These they attached to themselves by conferring on them a highly privileged position, as against the bulk of the native population, which enabled these *askaris* to assume a lordly and oppressive superiority over the rest of the natives.

"By this and other means they secured the attachments of a very small and insignificant minority, whose interests were directly opposed to those of the rest of the population and for whom they have no right to speak. The German treatment of the native populations in their colonies has been such as amply to justify their fear of submitting the future of those colonies to the wishes of the natives themselves.

"Finally there must be reparation for the injuries done in violation of international law. The peace conference must not forget our seamen and the services they have rendered to and the outrages they have suffered for the common cause of freedom.

Must Have Permanent Settlement.—"One omission we notice in the proposal of the Central Powers which seems to us especially regrettable. It is desirable and essential that the settlement after this war shall be one which does not in itself bear the seed of future war. But that is not enough. However wisely and well we may make territorial and other arrangements, there will still be many subjects of international controversy. Some, indeed, are inevitable.

"Economic conditions at the end of the war will be in the highest degree difficult owing to the diversion of human effort to warlike pursuits. There must follow a world shortage of raw materials, which will increase the longer the war lasts, and it is inevitable that those countries which have control of raw materials will desire to help themselves and their friends first. Apart from this, whatever settlement is made will be suitable only to the circumstances under which it is made, and as those circumstances change, changes in the settlement will be called for.

"So long as the possibility of a dispute between nations continues—that is to say, so long as men and women are dominated by impassioned ambition and war is the only means of settling a dispute—all nations must live under a burden, not only of having from time to time to engage in it, but of being compelled to prepare for its possible outbreak.

"The crushing weight of modern armaments, the increasing evil of compulsory military service, the vast waste of wealth and effort involved in warlike preparation—these are blots on our civilization, of which every thinking individual must be ashamed. For these and other similar reasons we are confident that a great attempt must be made to establish, by some international organization, an alternative to war as a means of settling international disputes.

"After all, war is a relic of barbarism, and just as law has succeeded violence as a means of settling disputes between individuals, so we believe that it is destined ultimately to take the place of war in settlement of controversies between nations.

"If, then, we are asked what we are fighting for, we reply, as we have often replied, We are fighting for a just and lasting peace, and we believe that before permanent peace can be hoped for three conditions must be fulfilled: First, the sanctity of treaties must be re-established; secondly, a territorial settlement must be secured, based on the right of self-determination or the consent of the governed, and, lastly, we must seek, by the creation of some international organization, to limit the burden of armaments and diminish the probability of war. On these conditions its peoples are prepared to make even greater sacrifices than those they have yet endured."

PRESIDENT WILSON'S PEACE PROGRAM.—In a message received with enthusiasm by all the allied peoples and warmly approved by nations still neutral, President Wilson, on January 8, re-stated before Congress the aims of the allied nations in the war. The specific terms were summarized in the following 14 points:

1. Open covenants of peace without private international understandings.
2. Absolute freedom of the seas in peace or war, except as they may be closed by international action.
3. Removal of all economic barriers and establishment of equality of trade conditions among nations consenting to peace and associating themselves for its maintenance.
4. Guarantees for the reduction of armaments to the lowest point consistent with domestic safety.
5. Impartial adjustment of all colonial claims, based upon the principle that the peoples concerned have equal weight with the interest of the government.
6. Evacuation of all Russian territory and opportunity for Russia's political development.
7. Evacuation of Belgium without any attempt to limit her sovereignty.
8. All French territory to be freed and restored, and reparation for the taking of Alsace-Lorraine.
9. Readjustment of Italy's frontiers along clearly recognizable lines of nationality.
10. Freest opportunity for autonomous development of the peoples of Austria-Hungary.
11. Evacuation of Roumania, Serbia and Montenegro, with access to the sea for Serbia, and international guarantees of economic and political independence and territorial integrity of the Balkan States.
12. Secure sovereignty for Turkey's portion of the Ottoman Empire, but with other nationalities under Turkish rule assured security of life and opportunity for autonomous development, with the Dardanelles permanently opened to all nations.
13. Establishment of an independent Polish state, including territories inhabited by indisputably Polish populations, with free access to the sea, and political and economic independence and territorial integrity guaranteed by international covenant.
14. General association of nations under specific covenants for mutual guarantees of political independence and territorial integrity to large and small states alike.

The speech in full follows:

Gentlemen of the Congress:

Once more, as repeatedly before, the spokesmen of the Central Empires have indicated their desire to discuss the objects of the war and the possible basis of a general peace. Parleys have been in progress at Brest-Litovsk between Russian representatives and representatives of the Central Powers, to which the attention of all the belligerents has been invited for the purpose of ascertaining whether it may be possible to extend these parleys into a general conference with regard to terms of peace and settle-

ment. The Russian representatives presented not only a perfectly definite statement of the principles upon which they would be willing to conclude peace, but also an equally definite program of the concrete application of those principles. The representatives of the Central Powers, on their part, presented an outline of settlement which, if much less definite, seemed susceptible of liberal interpretation until their specific program of practical terms was added. That program proposed no concessions at all, either to the sovereignty of Russia or to the preferences of the population with whose fortunes it dealt, but meant, in a word, that the Central Empires were to keep every foot of territory their armed forces had occupied—every province, every city, every point of vantage—as a permanent addition to their territories and their power. It is a reasonable conjecture that the general principles of settlement which they at first suggested originated with the more liberal statesmen of Germany and Austria, the men who have begun to feel the force of their own peoples' thought and purpose, while the concrete terms of actual settlement came from the military leaders who have no thought but to keep what they have got. The negotiations have been broken off. The Russian representatives were sincere and in earnest. They cannot entertain such proposals of conquest and domination.

Full of Significance and Perplexity.—The whole incident is full of significance. It is also full of perplexity. With whom are the Russian representatives dealing? For whom are the representatives of the Central Empires speaking? Are they speaking for the majorities of their respective Parliaments or for the minority parties, that military and imperialistic minority which has so far dominated their whole policy and controlled the affairs of Turkey and of the Balkan States, which have felt obliged to become their associates in this war? The Russian representatives have insisted, very justly, very wisely, and in the true spirit of modern democracy that the conferences they have been holding with the Teutonic and Turkish statesmen should be held within open, not closed, doors, and all the world has been audience, as was desired. To whom have we been listening, then? To those who speak the spirit and intention of the resolutions of the German Reichstag of the 9th of July last, the spirit and intention of the liberal leaders and parties of Germany, or to those who resist and defy that spirit and intention and insist upon conquest and subjugation? Or are we listening, in fact, to both, unreconciled and in open and hopeless contradiction? These are very serious and pregnant questions. Upon the answer to them depends the peace of the world.

Re-Statement of Specific Aims.—But whatever the results of the parleys at Brest-Litovsk, whatever the confusions of counsel and of purpose in the utterances of the spokesmen of the Central Empires, they have again attempted to acquaint the world with their objects in the war and have again challenged their adversaries to say what their objects are and what sort of settlement they would deem just and satisfactory. There is no good reason why that challenge should not be responded to, and responded to with the utmost candor. We did not wait for it. Not once, but again and again we have laid our whole thought and purpose before the world, not in general terms only, but each time with sufficient definition to make it clear what sort of definite terms of settlement must necessarily spring out of them. Within the last week Mr. Lloyd George has spoken with admirable candor and in admirable spirit for the people and government of Great Britain. There is no confusion of counsel among the adversaries of the Central Powers, no uncertainty of principle, no vagueness of detail. The only secrecy of counsel, the only lack of fearless frankness, the only failure to make definite statement of the objects of the war, lies with Germany and her allies. The issues of life and death hang upon these definitions. No statesman who has the least conception of his responsibility ought for a moment to permit himself to continue this tragical and outpouring of blood and treasure unless he is sure beyond a peradventure that the objects of

the vital sacrifice are part and parcel of the very life of society and that the people for whom he speaks think them right and imperative as he does.

Response to Russia.—There is, moreover, a voice calling for these definitions of principle and of purpose which is, it seems to me, more thrilling and more compelling than any of the many moving voices with which the troubled air of the world is filled. It is the voice of the Russian people. They are prostrate and all but helpless, it would seem, before the grim power of Germany, which has hitherto known no relenting and no pity. Their power apparently is shattered. And yet their soul is not subservient. They will not yield either in principle or in action. Their conception of what is right, of what is humane and honorable for them to accept, has been stated with a frankness, a largeness of view, a generosity of spirit, and a universal human sympathy which must challenge the admiration of every friend of mankind; and they have refused to compound their ideals or desert others that they themselves may be safe. They call to us to say what it is that we desire, in what, if in anything, our purpose and our spirit differ from theirs; and I believe that the people of the United States would wish me to respond with utter simplicity and frankness. Whether their present leaders believe it or not, it is our heartfelt desire and hope that some way may be opened whereby we may be privileged to assist the people of Russia to attain their utmost hope of liberty and ordered peace.

No Secret Peace.—It will be our wish and purpose that the processes of peace, when they are begun, shall be absolutely open, and that they shall involve and permit henceforth no secret understandings of any kind. The day of conquest and aggrandizement is gone by; so is also the day of secret covenants entered into in the interest of particular governments and likely at some unlooked-for moment to upset the peace of the world. It is this happy fact, now clear to the view of every public man whose thoughts do not still linger in an age that is dead and gone, which makes it possible for every nation whose purposes are consistent with justice and the peace of the world to avow now or at any other time the objects it has in view.

We entered this war because violations of right had occurred which touched us to the quick and made the life of our own people impossible unless they were corrected and the world secured once for all against their recurrence. What we demand in this war, therefore, is nothing peculiar to ourselves. It is that the world be made fit and safe to live in; and particularly that it be made safe for every peace-loving nation which, like our own, wishes to live its own life, determine its own institutions, be assured of justice and fair dealings by the other peoples of the world, as against force and selfish aggression. All the people of the world are in effect partners in this interest and for our own part we see very clearly that unless justice be done to others it will not be done to us.

World's Peace Program.—The program of the world's peace, therefore, is our program, and that program, the only possible program, as we see it, is this:

I. Open covenants of peace, openly arrived at, after which there shall be no private international understandings of any kind, but diplomacy shall proceed always frankly and in the public view.

II. Absolute freedom of navigation upon the seas, outside territorial waters, alike in peace and in war, except as the seas may be closed in whole or in part by international action for the enforcement of international covenants.

III. The removal, so far as possible, of all economic barriers and the establishment of an equality of trade conditions among all the nations consenting to the peace and associating themselves for its maintenance.

IV. Adequate guarantees given and taken that national armaments will reduce to the lowest point consistent with domestic safety.

V. Free, open-minded, and absolutely impartial adjustment of all colonial claims, based upon a strict observance of the principle that in determining all such questions of sovereignty the interests of the population

concerned must have equal weight with the equitable claims of the government whose title is to be determined.

VI. The evacuation of all Russian territory and such a settlement of all questions affecting Russia as will secure the best and freest co-operation of the other nations of the world in obtaining for her an unhampered and unembarrased opportunity for the independent determination of her own political development and national policy, and assure her of a sincere welcome into the society of free nations under institutions of her own choosing; and, more than a welcome, assistance also of every kind that she may need and may herself desire. The treatment accorded Russia by her sister nations in the months to come will be the acid test of their good-will, of their comprehension of her needs as distinguished from their own interests, and their intelligent and unselfish sympathy.

VII. Belgium, the whole world will agree, must be evacuated and restored, without any attempt to limit the sovereignty which she enjoys in common with all other free nations. No other single act will serve as this will serve to restore confidence among the nations in the laws which they have themselves set and determined for the government of their relations with one another. Without this healing act the whole structure and validity of international law is forever impaired.

VIII. All French territory should be freed and the invaded portions restored, and the wrong done to France by Prussia in 1871 in the matter of Alsace-Lorraine, which has unsettled the peace of the world for nearly 50 years, should be righted, in order that peace may once more be made secure in the interest of all.

IX. A readjustment of the frontiers of Italy should be effected along clearly recognizable lines of nationality.

X. The peoples of Austria-Hungary, whose place among the nations we wish to see safeguarded and assured, should be accorded the freest opportunity of autonomous development.

XI. Roumania, Serbia, and Montenegro, should be evacuated; occupied territories restored; Serbia accorded free and secure access to the sea; and the relations of the several Balkan States to one another determined by friendly counsel along historically established lines of allegiance and nationality; and international guarantees of the political and economic independence and territorial integrity of the several Balkan States should be entered into.

XII. The Turkish portions of the present Ottoman Empire should be assured a secure sovereignty, but the other nationalities which are now under Turkish rule should be assured an undoubted security of life and an absolutely unmolested opportunity of autonomous development, and the Dardanelles should be permanently opened as a free passage to the ships and commerce of all nations under international guarantees.

XIII. An independent Polish State should be erected which should include the territories inhabited by indisputably Polish populations, which should be assured a free and secure access to the sea, and whose political and economic independence and territorial integrity should be guaranteed by international covenant.

XIV. A general association of nations must be formed under specific covenants for the purpose of affording mutual guarantees of political independence and territorial integrity to great and small states alike.

Stand Together to the End.—In regard to these essential rectifications of wrong and assertions of right, we feel ourselves to be intimate partners of all the governments and people associated together against the imperialists. We cannot be separated in interest or divided in purpose. We stand together until the end.

For such arrangements and covenants we are willing to fight and continue to fight until they are achieved; but only because we wish the right to prevail and desire a just and stable peace, such as can be secured only by removing the chief provocations to war, which this program does remove.

We have no jealousy of German greatness, and there is nothing in this program that impairs it. We grudge her no achievement or distinction of learning or of pacific enterprise such as have made her record very bright and very enviable. We do not wish to injure her or to block in any way her legitimate influence or power. We do not wish to fight her either with arms or with hostile arrangements of trade, if she is willing to associate herself with us and the other peace-loving nations of the world in covenants of justice and law and fair dealing. We wish her only to accept a place of equality among the peoples of the world—the new world in which we now live—instead of a place of mastery.

Neither do we presume to suggest to her any alteration or modification of her institutions. But it is necessary, we must frankly say, and necessary as a preliminary to any intelligent dealings with her on our part, that we should know whom her spokesmen speak for when they speak to us, whether for the Reichstag majority or for the military party and the men whose creed is imperial domination.

We have spoken now, surely, in terms too concrete to admit of any further doubt or question. An evident principle runs through the whole program I have outlined. It is the principle of justice to all people and nationalities, and their right to live on equal terms of liberty and safety with one another, whether they be strong or weak. Unless this principle be made its foundation, no part of the structure of international justice can stand. The people of the United States could act upon no other principle, and to the vindication of this principle they are ready to devote their lives, their honor, and everything that they possess. The moral climax of this, the culminating and final war for human liberty, has come, and they are ready to put their own strength, their own highest purpose, their own integrity and devotion to the test.

UNITED STATES

GOVERNMENT CONTROL OF RAILROADS.—On December 26 President Wilson issued a proclamation declaring that on December 28 the government would take possession and assume control "of each and every system of transportation and the appurtenances thereof located wholly or in part within the boundaries of the continental United States, and consisting of railroads, and owned or controlled systems of coastwise and inland transportation, engaged in general transportation." This action did not include street and so-called interurban lines. Control of the railroads was vested in the Secretary of the Treasury, Mr. McAdoo, who was appointed Director General of Railroads. The President stated that he would recommend to Congress a guaranteed income to the railroads based on the average of their net profits during the three years ending June 30, 1917. This was estimated to represent an average profit of 5.32 per cent.

COAL SHORTAGE FORCES NATIONAL SHUT-DOWN.—On January 17 Fuel Admnistrator H. A. Garfield issued a proclamation ordering that all industries (with certain exceptions named by War and Navy departments), all professional offices (except physicians, dentists, and government officials), all stores and business buildings, should use no fuel, save sufficient to prevent freezing, on January 18, 19, 20, 21 and 22, and on each Monday following up to and including March 25. The order included all states east of the Mississippi and also Minnesota and Louisiana. The purpose of the order was to save fuel and at the same time lessen the burden of freight on the railroads.

GERMANY

PRUSSIAN REFORM BILLS.—Three reform bills have been introduced in the Prussian lower house. They are summarized as follows in the *Frankfurter Zeitung:*

"The first bill regulates the Prussian franchise as follows: Every Prussian subject who has been such for at least three years, has resided in the same parish at least one year, and is at least 25 years of age, will be entitled to vote. Each elector will have one vote and all elections will be by secret ballot. In cases where no candidate obtains an absolute majority, a second ballot will be necessary. The bill also provides for the redistribution of seats, giving a slight increase to the number of representatives in the larger towns.

"The second bill modifies the right of the Prussian Herrenhaus as regards the control of finances. Whereas, heretofore, the Herrenhaus could adopt or reject a budget *en bloc*, now the bill provides that henceforth a budget may be discussed in detail and single clauses amended.

"The third bill deals with the reform of the Herrenhaus and proposes that it shall be thus composed: Ten representatives of the princely houses, 24 from the princes and counts, 26 from the remainder of the hereditary nobility, 36 burgomasters, 36 great land-owners, 36 representatives of commerce and industry, 76 from local governing bodies, both municipal and rural, 36 from agriculture, 36 from trades, 12 from the artisan class, 16 from the universities, and 16 ecclesiastics, while the Kaiser, as King of Prussia, will nominate 150 other peers, making a total of 510 representatives."

While apparently introducing a favorable extension of the franchise, the first bill has been criticized by the German Socialist press on the ground that it needlessly increases the age limit and restricts the labor vote by long residence requirements.

The bills reconstructing the Upper House, while increasing the representation of the cities and the moneyed classes, leave that body safely under the control of the Emperor and nobility; and at the same time the Upper House is given a greatly increased power over financial measures. "In future," according to the *Westminster Gazette*, "it will be able to reverse the decision of the Lower House upon any particular vote, while the government will have power to proceed with the expenditure of money, even if the budget is not voted."

SOUTH AMERICA

ADDITIONAL LUXBURG DISPATCHES.—On December 20, Secretary Lansing, acting in concert with the Argentina Foreign Office, published 38 further dispatches between the German chargé at Buenos Aires and the Berlin Foreign Office, covering the period from July 7 to September 1, 1917, and dealing chiefly with negotiations in the *Toro* case and German intrigues in South America. The notes indicate that Count Luxburg regarded President Irgoyen of Argentina as favorably disposed, and sought through him to maintain a favorable attitude on the part of Argentina, Chili, and Bolivia. The notes are similar in tone to those published on September 8 and October 30, and contain little additional information.

REVIEW OF BOOKS

ON

SUBJECTS OF PROFESSIONAL INTEREST

"Under Fire (Le Feu), The Story of a Squad." By Henri Barbusse. Translated by Fitzwater Wray. $1.50. (New York: E. P. Dutton & Co.)

There is already such a flood of personal memoirs of the great war that it is necessary to sort out the distinctive from the commonplace. One cannot read everything, even among war books. Everyone would agree, probably, that Empey's "Over the Top" stands high among the distinctive books, and there can be no question but that "Under Fire" belongs with it. In its French version, "Under Fire" received the prize awarded by the Académie Goncourt for the best book published in France last year.. This verdict of approval by the critics has been confirmed by immediate popularity both in France and in America. Over 300,000 copies have been sold in France, and in its English version it has already run through nine editions since last August.

In one sense "Over the Top" and "Under Fire" are alike; both describe the life of the private in the trenches. In both we have the dug-out, the advance post, the firing platform, the vermin, the mud, the charge and countercharge. But the two books differ in tone as the authors differ in personality. Empey, an adventurous young American, tells his story with a lively sense of humor, much as a college boy might give an account of a vacation in the woods. After all, it was a big adventure, with many thrills and not a little fun. But M. Barbusse looks on the war through the eyes of maturity and reflection. He is an "intellectual," who stands in the bloody slime of the trenches with too poignant a sense of the horrors about him to feel any of the thrills of the younger man, or to share in his laughter. To the author of "Under Fire" this war is simply the most hideous tragedy the world ever saw.

The striking feature of this book is its vivid realism. Soldiers have complained that the correspondents have sent home only a washed and dressed image of the war. There can be no such complaint here. M. Barbusse takes pains to present the thing in its stark and horrible nakedness; consequently it is not the book for fastidious nerves. The author tries to give faithfully the life of his squad exactly as it is, in trench, rest billet, or dressing station. It appears that under the conditions of war these men come to have the same point of view toward everything, no matter from what part of France or what rank of society they came from. They bear no malice toward the Boche soldier, but always speak of the Boche officer as a kind of vermin. As for themselves they have ceased to hope; they merely endure. The one overmastering hatred that they all share is directed toward those in high places who have brought this war to pass.

The concluding chapter, "The Dawn," depicts a scene as impressive and as horrible as any circle of the Inferno. A group of soldiers, one of them

dying of his wound, lie mired in the Flanders plain, waiting for the dawn. As they lie there, half buried in the slime and surrounded by corpses, they talk on the war and its purposes; and they reach the conclusion that, after all, the real object of this war is to end war forever. This clearly is the object of the book itself. Certainly no one has ever written as terrible an indictment of what is called the "glory of war." W. O. S.

"Radio Communication." By John Mills, Research Department, Western Electric Company, Inc., Mem. Inst. Radio Eng., A. I. E. E., American Physical Society. 203 pages, 5 x 7½, illustrated. Price $1.75. (New York City: McGraw-Hill Book Co.)

The advances in engineering are usually about a year old before they receive publicity in the current periodical literature. Before appearing in book form they may be anywhere from two to five years old. The present book is an exception to this statement, for in most respects it is very much up to date. As a consequence of this early appearance in book form, not all the errors have had time to be eliminated, occasional paragraphs are without proper headings, and the transition matter between subjects is not always entirely adequate.

The book might well be called "Notes" on Radio Communication. The notes on the Vacuum Tube as a Detector, the Vacuum Tube as an Oscillator, the Vacuum Tube as an Amplifier, the Telephone Receiver, and Circuits of More than One Degree of Freedom are excellent. Many of the notes are gems of clear explanation, with the possible exception of that on the Arc Generator.

This is not an elementary book from the point of view of either mathematics or of radio. To those who have done some previous reading in Radio, for example as in (a) Chapters 26, 27, and 28 of Volume I of Bullard's "Naval Electricians' Text Book," 1915 Edition, or in (b) Chapters 23, 24, and 25 of Volume I of the 1917 Edition of the same book, or in (c) Robison's "Manual of Wireless Telegraphy," or in (d) G. W. Pierce's "Principles of Wireless Telegraphy," then this book will be a very valuable supplement. The mathematical training of a graduate of the U. S. Naval Academy or of a technical school will be sufficient preparation for reading this book. The novel handling of the mathematics applicable to radio will be found very helpful. In many cases the mathematics has been very cleverly simplified. The book, however, cannot be called non-mathematical.

The Appendix, dealing with Transmission Over Wire Circuits, is of interest primarily in the transmission of speech over very long distance telephone lines.

The Problems with answers and solutions at the end of the book form a helpful adjunct to the text.

Summing up it may be said that although this set of notes was hurriedly put in print, it contains both mathematical and radio notes which should be of the greatest help to the student of radio engineering. The diagrams and problems are excellent. On the whole this is a most welcome and timely book. L. A. D.

"Internal Combustion Engine Manual." By F. W. Sterling, Lieut. Comdr., U. S. Navy (Retired). 163 pages, 93 illustrations. Index of 3½ pages.

The manual has been written and revised to meet the needs of the course in marine engineering at the U. S. Naval Academy. This is the fourth edition of this book, which has now been used for eight years as a text book at the Naval Academy. The subjects of the several chapters are: Fuels; Construction; Types; Cycles, etc.; Carburetion; Ignition; Cooling and Lubrication; Governing and Indicator Cards; Operation, Troubles, and Remedies; Gasolene, Kerosene, and Alcohol Engines; Aerial Motors; The Diesel Engine. Included in the text are descriptions of the following U. S. Navy types: Gasolene engine, Diesel engines, and the Standard submarine chaser engine.

This book has been accepted by the U. S. Naval Service for the use of the student and the operator of the internal combustion engine, and is valuable in that it treats fully of the fundamentals of the subject as well as giving practical details of construction and directions for operation and upkeep.

G. J. M.

"The Journal of Submarine Commander Von Forstner," Translated by Mrs. Russell Codman. $1.00 net. (Houghton, Mifflin Company.)

It is unfortunate that no author has yet given us a personal narrative of the activities of any navy in this war that can compare with Ian Hay's "First Hundred Thousand," or Empey's "Over the Top." The censorship has effectually limited the output of personal narratives by naval officers of our allies, and the books that have come from German sources, with the exception of the stories of the *Emden* and *Ayesha*, have been all too evidently a part of the German propaganda and intended wholly for home consumption. This "Journal of Submarine Commander Von Forstner" is interesting and admirably translated, but fails to tell us any more of the life and activities of the submarine flotilla than the reader can get from the quotations from German newspapers that find their way to this country. It is obviously intended for Teutonic readers and was published, originally, to justify the submarine warfare on commerce and to convince the German people that the U-boat operations would soon lead to victory.

Von Forstner describes briefly life aboard a submarine, how it is submerged and how its operations are conducted; he tells of several cruises made by the boat under his command during the period before "sinking without warning" became the policy of his Almighty War Lord. The journal must have been published in Germany before unrestricted submarine warfare became effective, because there is none of the usual German attempt at justification of this practice. John Hays Hammond, Jr., wrote the introduction in which he discusses the operations of the submarines and the practicable methods of restricting their activities.

As one of the books on the war, Von Forstner's Journal has its place in the library of the student of current history; after the war, when the censorship is lifted and the whole truth can be told, it will be interesting to note how little books like this one really told us of history while it was being made. P. P. B.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-fifth year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be two dollars and fifty cents, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly; subscription for non-members, $3.00; enlisted men, U. S. Navy, $2.50. Single copies, by purchase, 30 cents; issues preceding January, 1918, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1919

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best essay on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the essay.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All essays published in the PROCEEDINGS during 1918, which are deemed by the Board of Control to be of sufficient merit, will be passed upon by the Board during the month of January, 1919, and the award for the prize will be made by the Board of Control, voting by ballot.

2. No essay received after November 1 will be available for publication in 1918. Essays received subsequent to November 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best essay published during 1918 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. Essays are limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

6. It is requested that all essays be submitted typewritten and in duplicate; essays submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

G. M. RAVENSCROFT,
Lieut. Commander, U. S. N., Secretary and Treasurer.

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BY

THE PRESIDENT OF THE NAVAL INSTITUTE, THE SUPERINTENDENT OF THE NAVAL ACADEMY, THE PRESIDENT OF THE NAVAL WAR COLLEGE, AND THE COMMANDERS-IN-CHIEF OF THE ATLANTIC, PACIFIC AND ASIATIC FLEETS.

"The Mutual Relations of Gunnery and Tactics."

"The Place of the Naval Officer in International Affairs."

"The Evolution of Naval Doctrine from National Character."

"The Training of Enlisted Personnel to Produce Modern Man-o'-Warsmen: (a) Military Training; (b) Moral Training; (c) Education."

"The Organization, Employment and Training of Reserve Fleets and Flotillas."

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut. Commander Richard Wainwright, U. S. N.

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1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of Its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

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SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

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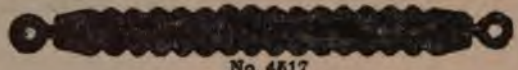

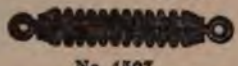

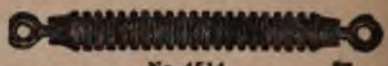

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"ALVARADO HUNTER"
A BIOGRAPHICAL SKETCH

By REAR ADMIRAL CASPAR F. GOODRICH, U. S. Navy

INTRODUCTORY

For some time past I have thought that too little is generally known of our minor naval heroes, men who served their country faithfully; took their full share in her battles; on occasion offered up their lives on the altar of patriotism, their last great sacrifice; but, who, from causes beyond their control, failed to achieve the national distinction of a John Paul Jones, Barry, Hull, Decatur, Bainbridge and Farragut among others whose memory their fellow countrymen still delight to honor. It was but natural, therefore, that I should gladly seize upon the opportunity, so kindly extended by Lieutenant George T. Emmons, U. S. Navy, of running over some of the papers accumulated and preserved with scrupulous care by his father, the late Rear Admiral George F. Emmons, U. S. Navy. Almost the first item to meet my eye contained the charges against the late Lieutenant Charles G. Hunter, U. S. Navy, with the sentence of the court and the public reprimand pronounced by his commander-in-chief at the time of the Mexican War. This, a *cause célèbre* of that day, is referred to more or less briefly in all naval histories. From the episode which gave rise to the court martial, Hunter acquired the soubriquet of "Alvarado," by which he has since been universally known. The finding in Admiral Emmons' papers of copies of the original docu-

ments in this affair seemed a call to put into practice my rather vague idea of reviving interest in the sailors whose service in subordinate capacities, however valuable, still lack that public recognition to which they appear to be entitled. To the query, "Why not begin with Alvarado Hunter?" I could make no reply other than an acceptance of the task which chance appeared to have allotted me. If I can depict the splendid gallantry he displayed on the Mexican coast and tell of the grave injustice to which he was subjected in consequence, I shall have discharged a portion of a self-imposed duty; but fairness to all concerned necessitates an attempt to bring to light the character of the man himself, with his faults, errors, misfortunes as well as his virtues and his successes, for Hunter's nature was an extraordinary mosaic of strengths and weaknesses.

EARLY YEARS

The subject of this sketch was born November 9, 1809, in Trenton, N. J., the son of an eminent lawyer of that city. He was admitted to West Point on July 1, 1824, as appointed from the state of New Jersey. On November 30 of the same year he tendered his resignation for reasons not to be found, the records of that institution having been almost completely destroyed by fire in 1838,[1] but it may be presumed that he preferred a naval career and sought transfer to the web-footed branch of the service. His warrant as midshipman was dated November 9, 1824. He joined the U. S. S. *North Carolina*, 74, from which, at Port Mahon, February 18, 1826, he forwarded the formal acceptance of his warrant. Why this long delay and what he did between the dates of his appointment and his acceptance are not known. He served three years on board of the *North Carolina*, then two more on board of the schooner *Porpoise* and the frigate *Java*, still in the Mediterranean. After an absence from home of nearly five years he returned (probably in the *Java*) to be examined for promotion. On February 20, 1830, he was made a "passed midshipman," thus mounting the first step of the hierarchical ladder.

It is about this time that the official record begins to show evidence of Hunter's disposition, which was certainly wayward

[1] Letter of Colonel C. P. Townsley, superintendent of the Military Academy.

if not indeed occasionally quarrelsome. The particular occurrence in illustration had a tragic ending. It may thus be summarized. Towards the close of the year 1829, at a dinner in Philadelphia, a Mr. G. made a remark which was considered offensive by a Mr. D. The dispute was amicably settled. Early in 1830, Dr. D., a brother of D., received an unpleasant anonymous letter and charged G. with its writing. G. denied the charge and sent to D. a challenge which D. refused to accept. Now appeared on the scene Midshipman Duryee as G.'s friend and William Miller, a promising young lawyer of Philadelphia, as D.'s friend. Midshipman D. denounced D., who challenged him. A Lieutenant Westcott turned up as Midshipman D.'s friend. Being a strict interpreter of the code, W. declared that Midshipman D. should not meet D. until D. had met G. A written request that a joint conference be held by friends of Duryee and D. was refused by Miller who did not wish to reopen the controversy. Hunter, as Duryee's friend, visited Miller and obtained a promise that the written request just mentioned should be destroyed. After Miller had burnt all the copies believed to exist, the letter appeared in print, whereupon Hunter charged Miller with the responsibility of the publication and challenged him. Miller, having declined the challenge, was posted as a coward and had to fight. The duel took place March 21, 1830, near Chester, Pennsylvania. Miller was killed at once. Gazing at the prostrate form, Hunter said: "Gentlemen, I assure you that I had no enmity against that man. His blood must rest upon the heads of others who dragged him into the quarrel."[2] It was averred by those who knew Lieutenant Hunter well that remorse for this fatal act haunted him through life, inducing a restless craving for distraction of mind which made constant excitement a necessity to him.[3] Ten days later all the naval officers implicated in this sad affair, including Hunter, were summarily dismissed by President Jackson.

We should not judge Hunter and his colleagues too harshly or by the standards of to-day, when nothing is more unusual or seems

[2] *United States Gazette*, March 24, 1830, which also prints the correspondence preceding the duel. For other details, see Dr. Chas. O. Paullin's "Duelling in the Old Navy," PROC. NAV. INST., No. 132; also, the "Fatal Duel between Hunter and Miller," Jonathan Elliott, Washington, 1830.

[3] Newspaper clipping of 1856, pasted in the Philadelphia Library's copy of Sabines' "Notes on Duelling."

more barbarous than the duello. In his time the "code" was not only reverenced in theory, but was followed as a practical guide in the conduct of officers and of those who called themselves gentlemen. None the less, this instance appears to have been exceptionally cold-blooded and unnecessary. A contemporaneous obituary of Hunter states that

> warrants were issued for his arrest, and he was forced to flee to avoid apprehension. He first went to Boston, and from thence to Montreal. He soon after returned in disguise to New Jersey, and remained for some time secreted in the house of a Mrs. Griffiths, in the town of New Brunswick. While so secreted he became enamored of his protector's daughter, and was subsequently married to her. When the commotion caused by the duel had in some measure subsided, he went to Washington, obtained an interview with General Jackson, explained all the facts connected with the duel, and solicited to be restored to his former position. The President listened silently to the young man's appeal, and answered it by saying, "I will think of the matter." The next day young Hunter received notice that through the partiality of the President he was restored to his former post.[4]

This is not strictly accurate, for he was put at the foot of the list of passed midshipmen and not allowed pay for the time he was out of the navy.[5]

Part of the year of his restoration (1833) he commanded the schooner *Shark*, one gun, employed in the protection of timber on our southern coast. From the *Shark* he was transferred to the sloop-of-war *Falmouth*, 18 guns, in the West Indies squadron. His promotion to the grade of lieutenant is dated June 24, 1834.

His next cruise, 1837, on board of the frigate *United States* in the Mediterranean, was marked by his court martial for "gross and ungentlemanly conduct" and "misstating facts." The whole affair seems trivial, not to say amusing. The *United States* was lying in Port Mahon, Minorca Island, in the company of some other vessels, notably the French and British flagships. To create diversion, the American officers arranged a race on shore, Hunter backing a horse against a mare, the former to receive a stated distance allowance. At the conclusion of the race one of the judges, without consulting the others, declared the horse "distanced"—a finding which Hunter, who was close to the distance line, saw to be incorrect. He therefore at once entered a vigorous, not to say noisy, protest which naturally occasioned some dispute. Perceiving the confusion, his commander-in-chief, Commodore

[4] *Pennsylvanian*, March 7, 1856.
[5] Navy Department Records.

Jesse D. Elliott, rode up to the scene on a jackass, gesticulating wildly with a heavy walking stick, which he also used to prod his reluctant mount, and calling out repeatedly to Hunter "not to separate the officer from the gentleman." To this Hunter replied each time that he had not and never did. Whereupon the irate commodore ordered him off to his ship, put him under suspension and three days later brought him before a general court martial. The evidence, as solemnly printed in Executive Documents of the 25th Congress, makes delightful reading. Incidentally we get an idea of the real Hunter as known to his contemporaries. Witnesses testifying as to his character spoke of him as of "an energetic disposition"; as in manner "rather earnest and determined"; as "generally quick and with feeling." Of the charges preferred against him Hunter was "fully acquitted."

Did that end the matter? Quite the contrary. In his written defence he refers to Elliott's age, rank and achievements in such handsome terms as to make the latter believe them to have been sarcastic—which they doubtless were. So immediately he court-martialed Hunter again for using "contemptuous and satirical language to his commander-in-chief." The result was the same as in the first trial; the court promptly acquitted him. Whereupon Hunter preferred charges against Elliott and sent them to the Navy Department. No action followed.[6]

It is probable that Commodore Elliott, chafing under his failure to discipline Hunter and resenting Hunter's report to the Secretary of the Navy, sent him home at the earliest opportunity; for he was on leave the first of January, 1838, and was kept off duty until some time in 1839, when he joined the receiving ship at Norfolk. That he was again on leave January 1, 1841, is a bit suggestive of another row, of which, however, no record has been found.

On board the sloop-of-war *Fairfield* in the Mediterranean he made a three-year cruise which seems to have been peaceful so far as he was concerned, although marked by the mysterious murder at Port Mahon in 1842 of his mess-mate Patterson, the sailing master of the *Fairfield*. Late one night, while descending the hill by the winding path which led to the landing place and preceding, at some little distance, Hunter and the *Fairfield's* surgeon, Patterson was attacked and stabbed to the heart. His

[6] Executive Documents, 25th Congress, 3d Session, Vol. III, 1838-1839.

cry brought his companions to his side, the surgeon to his aid, Hunter to pursue the murderer, undoubtedly a native, who unfortunately made his escape in the darkness.[7]

During 1845 and 1846 he is briefly noted in the official records as on leave or waiting orders.

THE ALVARADO AFFAIR

Since men-of-war of that day were, with few exceptions, sailing vessels, our naval operations in the Gulf at the time of the Mexican War were hampered by the lack of steamers. To supply this deficiency the government purchased a number of such craft, among which was the *Bangor*, built in 1844 on the Delaware to ply between Boston and Bangor.[8] She was an iron paddle wheeler of only 230 tons, armed with one small gun and carrying a crew of but 50 men. Renamed the U. S. S. *Scourge*, she was sent early in 1847 to Vera Cruz under the command of Lieutenant Charles G. Hunter, who was directed to report to Commodore Matthew C. Perry, then the commander-in-chief of our naval force in Mexican waters. The speed of this tiny boat may be inferred from the fact that she was 12 days making the passage from New York to Havana where she spent two or three days, probably for coal and provisions. A man of Hunter's energy would not tarry unnecessarily on his way to the seat of war. We can imagine his disappointment on reaching Vera Cruz the very day, March 28, 1847, it was surrendered. However, an opportunity for service against the enemy offered itself immediately. How well he profited by it!

Some 30 odd miles to the southward of Vera Cruz lies the town of Alvarado at the mouth of the river of the same name. At the time of which we are writing it was so heavily fortified as to be looked upon, next to Vera Cruz, as "the Gibraltar of the Gulf."[9]

Twice during the previous year it had been attacked by our ships-of-war. On both occasions the latter were beaten off. These failures had created a great deal of dissatisfaction in the United States and an ardent longing in our fleet to retrieve a defeat. Its capture was furthermore desirable because at Alvarado was a large number of mules and horses much needed by the army in its contemplated advance on the city of Mexico.

[7] Parker's "Recollections of a Naval Officer."

[8] *San Francisco Argonaut*, January 29, 1916. Niles' Register, May 15, 1847.

[9] *Philadelphia Public Ledger*, May 19, 1847.

LIEUTENANT CHARLES HUNTER.

Between General Scott on shore and Commodore Perry afloat a joint expedition was at once planned against Alvarado. General Quitman, with a brigade reinforced by the 4th Regiment artillery, was to march overland and cut off the retreat of the enemy, whom Perry was to shell out of the town. The scheme was sound. There seemed to be no likelihood of its not being carried out most successfully to the great glory of Perry and Quitman.

How important this enterprise was deemed at Vera Cruz is seen in the following extracts from Vera Cruz letters of the day:

General Scott has shown great promptitude in following up his victory. A sufficient force to take Alvarado was immediately despatched under General Quitman.

Commodore Perry, with some of the smaller vessels of the navy, was to sail down to Alvarado to co-operate with General Quitman's brigade, and if resistance was made to attack the place by land and water.[10]

Since Perry's heavy ships were sailing vessels he ordered Hunter to proceed in advance and "watch the port." What Hunter actually did is told by a lieutenant of Perry's flagship, the frigate *Potomac*, William H. Parker, who, in his "Recollections of a Naval Officer," gives us this story:

As we approached the bar, we saw that something was wrong as the vessels were all under weigh instead of being at anchor. Very soon the *Albany* hailed us and said that Alvarado was taken. "By whom?" asked our captain. "By Lieutenant Hunter in the *Scourge*" was the reply. And so it was. Hunter, the day before, had stood in pretty close and observing indications of *flinching* on the part of the enemy, he dashed boldly in and captured the place almost without firing a gun. Not satisfied with this, he threw a garrison, *consisting of a midshipman and two men*, on shore and proceeded in his steamer up the river to a place called Tlacotalpan which he also captured.[11]

When General Quitman arrived with his brigade and the place was gravely delivered over to him by Passed Midshipman William G. Temple, he was greatly amused and laughed heartily over the affair.

The accounts say that when the fleet got down to Alvarado, and Lieutenant Marin with five men to garrison a town and seven forts, delivered the command of them to Commodore Perry, all the officers and men in the squadron were convulsed with laughter, and their roars induced the inhabitants of Vera Cruz to believe Alvarado was bombarded.[12]

The following is Hunter's own account of the affair, and the articles of capitulation of both the towns captured:

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[10] Vera Cruz letters, summarized in the *Pennsylvanian*, April 13, 1847.

[11] Parker's "Recollections."

[12] *Philadelphia Public Ledger*, April 20, 1847.

U. S. STEAMER "SCOURGE"
ALVARADO, April 2d, 1847.

Sir: I have the honor to report that on the afternoon of the 30th ultimo, at about 5 o'clock, I arrived off the bar of this river; that I immediately opened upon the forts with round shot and shell; but finding a heavy surf on the bar, and seeing indications of a norther, I stood off and on during the night. In the morning I again opened on the forts, when I discovered a white flag on the beach, and, shortly after, the captain of the port and a pilot came off with a flag of truce, offering a surrender of the place, and informing me that the Mexican troops (to the number of three or four hundred) had, after our attack, evacuated the forts and city the night previous, having first fired all the government vessels, spiked a portion of the guns, and buried others in the sand. With a view of preventing any further destruction of public property, or a return of the Mexicans before your arrival, and for the purpose of securing an unobstructed entrance for the squadron, I came in, anchored off the town, received their surrender, (a copy of which I herewith enclose) hoisted the American flag under a salute of twenty-one guns, and then, hearing that the garrison of the place were hastening up the river with two or three vessels loaded with arms, ammunition, and other public property, I left Passed Midshipman Temple, with five men, in command of the place, and stood up the river after them. On the way up I succeeded in capturing four schooners; one I burned, as I could not get her off; another I left behind as worthless; the third I towed down; and the fourth is now coming down under the command of Passed Midshipman Pringle. At 2 o'clock in the morning I anchored off Fla-co-Talpam, a city of about 7000 inhabitants, sent Lieutenant Marin ashore to the alcade, assembled the junta and demanded an entire and unconditional surrender within half an hour. My demands were at once complied with, and I herewith transmit a copy of their surrender.

I am, &c.
(Signed) C. G. HUNTER, Lt. Comnd'g.

To Commodore M. C. Perry, Commander-in-Chief of the Gulf Squadron.

THE TERMS OF CAPITULATION

TOWN OF FLA-CO-TALPAM, 1st April, 1847—2 o'clock A. M.—

Present, the constitutional Alcalde and citizens who compose this illustrious council on the one side, and on the other Captain C. G. Hunter, of the United States steamer *Scourge*, accompanied by the second lieutenant of that vessel, M. C. Marin; the object being to enter into such negotiations as shall be suitable for the welfare of the inhabitants, and better understanding with that nation, the terms expressed in the following articles were agreed to by both parties:

First.—The town of Fla-co-Talpam hereby declares its perfect neutrality towards the forces of the United States, and also its entire submission to them as long as existing circumstances continue.

Second.—In consideration of this, the said Captain, in the name of the government, whose commission he holds, binds himself that the right of

individuals shall be respected, as also their persons and private property likewise the Catholic religion, and the free exercise of its forms of worship.

And for the fulfilment and faithful observance of this compact, both the contracting parties hereby bind themselves by all the forms usual; and in testimony of the same, they have hereby subscribed their names to two copies of this contract, each of the same tenor and date. Done by the Alcalde, presiding officer of this council, and the before-named second lieutenant, who assisted in arranging this negotiation, and who is commissioned to sign for the before-mentioned Capt. Charles G. Hunter.

(Signed) PEDRO ATALPICO
M. C. MARIN, Lieut. U. S. N.

The town of Alvarado having been left defenceless, surrenders itself to the United States steamer *Scourge*, Captain C. G. Hunter, on the following conditions:

First.—That the forces of the United States will respect and protect the Roman Catholic religion.

Second.—That they solemnly guarantee complete and entire protection to the inhabitants of this town, and all species of property, it being distinctly understood that no public edifice or private house shall be taken or used by the United States forces, unless some previous arrangement shall have been made with the owners.

JOSE RUIZ PARRA,
President of the Council.
M. C. MARIN,
Lieut. U. S. Navy.

ALVARADO, 31st March, 1847.

A newspaper of that time says:

We can imagine the feelings with which Commodore Perry must have surveyed his squadron of vessels and the military force on shore, all set forth in the pride and puissance of war to take the town of Alvarado, which had been already taken by a single vessel without firing a shot. Had Commander Hunter not converted the blockade into an attack, and permitted the land and naval forces to come down upon, and reduce the city, the credit would have been given to the imposing force, and another laurel leaf would have graced the chaplets which Perry and Quitman wear. But as it is, the vessels lie quietly off the town, which the *Scourge* has taken, or have proceeded North, and Gen. Quitman having marched far enough to find his intended work done to his hands, has quietly marched back again.

It may be proper, but we think Commodore Perry should have mentioned how Alvarado was taken and not permit the impression to go to the department that the combined forces reduced the city. Commander Hunter's name is not mentioned, and it deserves that for the gallantry of the act, at least, even if he is under arrest for transcending orders.[13]

The foregoing paragraphs give the facts in the case. To compare them with Commodore Perry's official report which follows

[13] *United States Gazette*, April 24, 1847.

makes one marvel how so big a man as he really was could have descended to such a level of spiteful pettiness:

UNITED STATES FLAG SHIP "MISSISSIPPI."
ANCHORAGE ANTON LIZARDO.
April 4, 1847.

Sir: I have the honor to inform the Department that immediately after the surrender of Vera Cruz, General Scott and myself concerted measures for taking possession of Alvarado. Although it was not expected that any defence would be made, it was thought advisable that strong detachments, both of the army and navy, should be employed, in view of making an imposing demonstration in that direction. The southern brigade under General Quitman was detached for this duty, and the naval movements were directed personally by myself [*sic*]. As it had been anticipated, not the slightest opposition was offered by the enemy, and the river and town were quietly occupied on the 2d instant by the combined forces of the army and navy. (!)

General Quitman took up his line of march this morning, on his return to Vera Cruz, and I left for this anchorage to arrange an expedition to the north; Captain Mayo, with a small naval detachment, being placed in command of Alvarado and its dependencies, in which may be embraced the populous town of Tlacotalpam, situated about twenty miles up the river.

In this expedition I have had the good fortune to become acquainted with General Quitman and many of the officers of his command, and have been gratified to observe a most cordial desire, as well with them as with the officers of the navy, to foster a courteous and efficient co-operation.

The enemy, before evacuating the place, burnt all the public vessels, and spiked or burned most of the guns, but those that were concealed have been discovered, and I have directed the whole number—about sixty—either to be destroyed or shipped, with the shot, on board of the gun boats, as they may be found of sufficient value to be removed.

With great respect, I have the honor to be your most obedient servant.

M. C. PERRY,
Commanding Home Squadron.

The Hon. John G. Mason, Secretary of the Navy.[14]

It is a tax on one's credulity to be asked to believe that this report is authentic. The answer may lie in Tertullian's remark, "*Credo quia impossible est.*" Yet the formal official document purports to describe events in which Perry had no part or lot and it does not even mention the man who had the wit to perceive and the courage to act, who after taking Alvarado pushed up the river some 30 odd miles, anchored off Tlacotalpan in the middle of the night, sent Lieutenant Marin ashore with a peremptory demand that the *ayuntamiento* or town council should meet at once and surrender the place, giving them half an hour for this purpose else would he

[14] *Pennsylvanian*, April 4, 1847.

"open on the town and *order the troops to advance!*" Since he had not a soldier or marine within call, was there ever in all history a more splendid, more audacious bluff than this? Yet it worked to perfection. Having left one midshipman and five bluejackets to hold and garrison Alvarado with its seven forts he left a lieutenant and three seamen to occupy Tlacotalpan with its 7000 inhabitants.

Lest it be thought that this account is exaggerated here are Hunter's letters *in extenso*.

U. S. STEAMER "SCOURGE"
ALVARADO, March 31st, 1847.

Sir: The surrender of the City *must be made* in 30 minutes from this time and *must be* unconditional.

If at the expiration of that time they do not agree to our terms I will open upon the town and order the troops to advance.

(signed) C. G. HUNTER
Lieutenant Commanding.

To Lieutenant M. C. Marin
at the Governor's House
Alvarado.

To be read to the Justices in Council Assembled.

No. 2. U. S. STEAMER "SCOURGE"
OFF TLACOTALPAM, March 31st.

Sirs: In order to avoid unnecessary bloodshed and in accordance with the spirit and feeling of civilized nations, I demand in the name of the United States of America an entire and unconditional surrender of the town of Tlacotalpam.

I have the honor to be, Sirs,
Yours &c,
C. G. HUNTER.

To the President and Ayuntamiento
of the City of Tlacotalpam.[15]

And what reward did Hunter receive for these magnificent services worthy of a Cushing? He was court-martialed! Incredible again, but true. The official record must once more be quoted in proof, and it is only proper that it be quoted in full.

CHARGES AND SPECIFICATIONS OF CHARGES, PREFERRED BY COMMODORE M. C. PERRY, COMMANDER-IN-CHIEF OF THE U. S. NAVAL FORCES IN THE GULF OF MEXICO, AGAINST LIEUTENANT CHARLES G. HUNTER, U. S. NAVY, LATE COMMANDING THE U. S. STEAMER "SCOURGE"

CHARGE FIRST.—Treating with contempt his superior, being in the execution of his office.

[15] Emmons collection.

Specification 1st.—In that the said Lieutenant Charles G. Hunter U. S. Navy, did on the 31st day of March, 1847, being then in the command of the U. S. Steamer *Scourge*, enter the Port of Alvarado, and did there arrogate to himself (the said Lieutenant Charles G. Hunter) the authority and powers that are vested only in the Commander in Chief, by entering into stipulations for, and receiving the surrender of Alvarado and its dependencies.

Specification 2d.—In that the said Lieutenant Charles G. Hunter, U. S. Navy, did on the 31st day of March 1847, with the U. S. Steamer *Scourge* under his command, proceed from Alvarado to the town of Tlacotalpam, without any orders or authority, and there demanded the surrender of the said town of Tlacotalpam, and enter into and sign articles of capitulation, although aware of the immediate approach of the Commander-in-chief, to whom alone such powers are confided, thus treating with contempt the authority of his Superior Officer being in the execution of his office.

Specification 3d.—In that the said Lieutenant Charles G. Hunter, U. S. Navy, did on the 31st day of March 1847, in proceeding from Alvarado to Tlacotalpam, capture four schooners; one of which he set on fire and burned, and another he abandoned, thus substituting his own will for the discretion of the Commander in Chief, who was within a few hours reach of communication; and treating with contempt the authority of his superior; all of which in violation of the laws of the United States as contained in "an act for the better government of the Navy of the United States, approved April 23d. 1800."

CHARGE SECOND.—Disobedience of Orders.

Specification 1st.—In that the said Lieutenant Charles G. Hunter, U. S. Navy, having been ordered to report to Captain Samuel L. Breese and to assist in blockading the port of Alvarado, did in disobedience or disregard to said orders enter the harbour and take possession of the town of Alvarado.

Specification 2d.—In that the said Lieutenant Charles G. Hunter, U. S. Navy, having been ordered on the evening of the 1st of April 1847, to report himself in person to the commander in Chief, at his quarters in the town of Alvarado, at 10 A. M. of the following morning, did disobey said order. All of which is in violation of the laws of the United States as contempt in "an act for the better government of the Navy of the United States, approved April 23d, 1800.

(signed) M. C. PERRY
Commander-in-Chief
U. S. Naval Forces
Gulf of Mexico.[16]

In justice to Hunter's memory and as showing how lofty were his professional principles, how great his respect to his seniors, even to one who had so grossly abused the prerogatives of his office, how plain and straightforward his speech, let us hear what he himself said in his defense against such unheard of charges.

[16] Emmons collection.

Mr. President and Gentlemen of the Court: I will not trouble you with unnecessary verbiage, but proceed at once to the point. My orders were, (as stated in the 1st spec. 2d charge) to report to Capt. Breese, and to assist in blockading Alvarado. I did not consider them (can they be fairly considered?) as forbidding me to annoy the enemy in every way in my power, as modifying in the slightest degree the general duty of every officer having a military command in time of war, to molest and cripple the enemy in every possible way. On the evening of the 30th March, being sufficiently near, I opened upon the fort at Alvarado with shot and shells. Apprehensive of a norther, I stood off and on during the night, with a strong breeze and rough sea. Towards morning, it having moderated, I stood close in to the bar, and again opened upon the forts. Shortly afterwards, I discovered two horsemen upon the beach, holding a white flag, and a boat crossing the bar at the same time. This boat brought me an offer on the part of the authorities to surrender the city. Permit me here to observe, Mr. President, that as there are two sides to every question, so there may be two results to every affair of this kind. Alvarado is now in our possession; but let us suppose that it was not to be: that we had been foiled a third time in our efforts to take it. What would have been my position, I say, if I, having refused the offer of the town when the authorities were ready to yield it—the American forces had been a third time baffled in their efforts to capture it? Mr. President, the worst that can now befall me is a trifle to the infamy and disgrace which would have remained attached to my name, perhaps, long after I was in the grave. If you, Mr. President, (or any member of this honorable Court,) will fancy yourself in my place when the offer of capitulation reached me, I think you must perceive that it placed me in a difficult, a most embarrassing position—one that might have got a much more experienced officer than myself into trouble. I had to decide upon the disobeying of my orders on the one hand, and the possible consequences which my refusal to take such a responsibility might lead to on the other. I had to decide between two courses—the one leading to present personal safety, and the possibility of future infamy; the other to some personal risk, perhaps, but by which the honor of the navy and my honor, at least, were safe. I have stated thus the view which I took of my position, and the motives on which my actions were founded. I will not say, Mr. President, that under similar circumstances you would have taken a similar view of your position; but I think I may say without the danger of dissent, here or elsewhere, that taking the same view I did, you or any other member of this honorable court, would have done just what I did. My summons for the surrender of the city of Alvarado, was not made until the authorities hesitating to sign the articles of capitulation, I thought myself entrapped, when it became necessary to use strong measures and strong language. Upon the reception of that summons, they signed the articles, and in the name of the United States of America, I took possession of Alvarado and its dependencies. Shortly afterwards, I learned that after our attack the evening previous, the garrison had fired the public vessels, spiked and buried their guns, placed a large quantity of government property, chiefly munitions of war, on board of several small vessels,

and were proceeding up the river in the direction of the city of Fla-co-Talpam. I followed, as I conceived it to be my duty, and captured one of them loaded with arms, &c., that got ashore, and burned her to prevent her falling into the hands of the enemy. Another, worthless to ourselves or the enemy, and abandoned, and two others, I brought to Alvarado. The pursuit of these vessels led me to the city of Fla-co-Talpam, where I arrived about two o'clock in the morning; trusting to the suddenness of the attack, I ordered the junta to assemble, and demanded within thirty minutes an entire and unconditional surrender, and my demands were complied with. I contend, Mr. President, and gentlemen of the court, that all that happened after the capitulation of Alvarado, followed as a natural and necessary consequence, (not, however, foreseen by me,) when I first accepted their offer to surrender. I contend that my error consisted in the original disobedience of my orders, (which, from what I have since learned, I regret,) and that what I did afterwards, I was in a great measure obliged to do. Knowing that several small vessels of the enemy, laden with military stores, were within my reach, could I doubt that it was my duty to destroy or capture them? Seeing, from the conduct of the enemy at Alvarado, that a panic prevailed among them, and that there was a prospect of success, I demanded the immediate and unconditional surrender of Fla-co-Talpam. I contend that these two acts followed as a necessary consequence to my first disobedience of orders. Of the motives that led to that step, I have made a honest exposition to the Court, and I hope that you will consider them, together with the difficulties of my position, and my want of experience in such matters, as some palliation of my fault. I regret my error, apart from the trouble it has brought upon me. I regret it, because it has given offence to the commander-in-chief. (I speak from rumor only—I have no certain knowledge of the fact,) as I have heard that was an understanding between the commander-in-chief and the commanding general ashore, that there was to be a combined attack made by the squadron and army, on these places; it might thus seem that I had sought to rob of its just participation in this affair that arm of the service which in the progress of this war, has acquired for itself and for our country, so much honor and glory. Nothing could be farther from my intentions—I knew nothing of any such understanding. One or two matters remain to be touched upon. I am charged in the two 1st spec. of the 1st charge, with arrogating to myself the powers of commander-in-chief, in signing articles of capitulation, &c., although aware of the immediate approach of the commander-in-chief. In regard to the first, my error was one of simple ignorance. I knew that I had obtained possession of these places, and meant of course to hand them over to the first senior officer that might approach; but I had not the remotest intention of exercising any of the powers of commander-in-chief. I knew, or perhaps I should rather say had reason to believe, that the commander-in-chief would arrive in a short time; but I did not know precisely when, still less did I know that he was nearer than Vera Cruz.

In the 2d specification of the 2d charge I am charged with having disobeyed an order to call at a specified time at the commander-in-chief's quarters.

Gentlemen, I was so absorbed by the difficulties that surrounded me, that his order to me to report myself, entirely escaped my recollection—this may seem a lame excuse, but it has at least the merit of truth. But, Mr. President, none of us are entirely free from occasional acts of forgetfulness; the honorable member yesterday who gave in his testimony, made a mistake, and I must say that the confidence with which I leave my case in his hands has been increased by the handsome manner in which he corrected his error when reminded of it.

Mr. President and gentlemen of the Court, I have been much mortified and excited, by the many and numerous difficulties that surround me. I have aimed at nothing but the glory of my country—the honor and dignity of the service to which I belong. I leave my case with perfect confidence in your hands.

C. G. HUNTER, Lieut. Comdg.

It is difficult to believe that in spite of these manly words he was found guilty of all the charges, except that of not reporting to Captain Breese, preferred against him. He was sentenced "to be dismissed the squadron" and reprimanded by the commander-in-chief, the reprimand "to be read on the quarter-deck of every vessel of the squadron, in the presence of the officers and crew." With what zest must the latter have performed his part in this regrettable affair may be inferred from his own letter to Hunter.

U. S. FLAG SHIP "MISSISSIPPI"

ANTON LIZARDO, April 9, 1847.

Sir: I inclose herewith the findings and sentence of the Court Martial convened for the 7th instant for your trial, which imposes upon me the task of expressing in the form of reprimand, my opinion of your conduct as proven before the Court. However lenient the sentence in your case may seem to be, I have approved of it, as I can conceive of no punishment more severe than a dismissal from a Squadron actively engaged before the enemy.

The sentence while it condemns in a most signal manner your conduct, cuts you off from further association in this Squadron with men whose partial endurance of the most trying duties, and whose character for courage, obedience, and subordination have won my highest approvation.

How different has been your course. Scarcely a day on the Station and you disobey orders, arrogate to yourself the duties belonging to a Commander in Chief, talk of opening upon the Town, and of ordering the Troops to advance when you had but one Gun, and not a solitary soldier, and all "for the purpose (as you say) of securing an unmolested entrance of the squadron" into the River. It would be difficult if not impossible to point to another instance of similar folly, and the most charitable construction that can be given to it, is that in the elation of a first command you have truly enjoined yourself actually in command of the Naval and Military

departments then approaching and within a short distance of the scene of your Exploits. With due Respect,

(signed) M. C. PERRY
Commanding Home Squadron."

To Lieut. Charles G. Hunter
U. S. Navy.

The reader will note the concluding expression of this astounding document "with due Respect."

It is not necessary to contend that a navy held in such leash as the irate Perry prescribed would lose all initiative and become practically valueless—nor to hold, had Perry summoned Hunter and after congratulating him upon one of the most gallant deeds in our naval history, had said, "My dear Hunter, don't you think that next time you might leave something for me?" that he would have had in Hunter a passionately devoted subordinate ready to go through fire and water for his chief.

As it was, Hunter was sent home in disgrace, ruined and embittered for life. From the effects of this colossal injustice he never recovered. How indeed could he? The writer believes that much of his subsequent misfortune may be fairly ascribed to the outrageous treatment he received off Alvarado.

AFTER ALVARADO

During the weeks succeeding this tragic episode the newspapers at home printed full accounts of it, for the most part rejoicing in a glorious, an almost unique, victory and condemning Perry in unmeasured terms for his misrepresentations, his unfounded claims to a personal participation and for his shocking punishment of an unusually gallant and energetic subordinate. Some, however, agreed with Perry. One side of the question was typically expressed by the *United States Gazette* of May 7, 1847, which said that "inferior officers must obey the orders of their superiors, under any circumstances of temptation to do otherwise or the efficiency of the navy or army is at an end." For this paragraph the *Gazette* is rebuked by the *New York Commercial Advertiser* in the rejoinder that

the spirit of all instructions was complied with by the very act of going beyond the letter. Nelson thought so; Taylor thought so; though neither of them might have suspected that the delay proposed was for anything but prudence, not for the purpose of transferring laurels. . . . . The Commo-

" Emmons collection.

dore rests under the suspicion of having envied the Lieutenant . . . . the little glory of conquering a town, and not allowing him, the Commodore, to come and take the glory of a victory which he had not achieved, for which he was not prepared and of which he should have been willing that some other person should have the glory.

Lieutenant Hunter is the theme of general remark and censure. . . . . A little more of the spirit in the Navy he has displayed would do it no harm and might add much to its efficiency in the present war.

The general sentiment throughout the country was that Hunter was a hero and Perry wholly in the wrong. Nor are Perry's supposed motives spared. The Washington correspondent of the *Philadelphia Ledger*[18] writes:

The reprimand of Lieutenant Hunter by Commodore Perry is, I can assure you, as much commented upon here as in Philadelphia and other places. It is looked upon as extremely ill-natured and wholly unwarranted by the circumstances of the case. Alvarado was, next to Vera Cruz, looked upon as the Gibraltar of Mexico, and the taking of it, with one gun, has turned the whole formidable expedition against it into ridicule. This it is for which Commodore Perry lectured him. . . . He . . . . destroyed all the glory which would have attached to the laying siege to or taking of the place by storm; he accomplished by a *coup de main* what had to be the result of scientific arrangement and execution; and hence his act of unparalleled "folly." Every disobedience of orders, however successful, must be punished, but there is no necessity for dipping the rod in vinegar! That is a luxury which ought not to be indulged in in time of war.

Much indignation also was felt among Hunter's colleagues in the navy who could not be indifferent to this humiliation inflicted as the consequence of dash and courage. So to punish the latter sapped all the springs of naval daring. One officer writes home,

This treatment of as gallant an officer as ever trod deck, for performing as gallant an act as could well be conceived, and with a success which makes his conduct entirely justifiable, will never receive the sanction of President Polk.[19]

Unhappily for Hunter nothing was ever done to right the wrong under which he labored, and the sanguine writer of the foregoing lines wholly misjudged the President.

Hunter was sent home, broken in spirit, to arrive at Norfolk May 25, 1847, a passenger in the U. S. S. *Ohio*.[20] Proceeding thence to New York,

He was received at the American Hotel with cheer after cheer by the enthusiastic crowd which assembled on learning his arrival. The people are

[18] May 19, 1847.
[19] *Pennsylvanian*, May 8, 1847.
[20] *United States Gazette*, May 28, 1847.

always just—they know how to reward a gallant action, and sweep technicalities aside when they interfere with strict justice."[21]

Hunter was indeed the idol of the hour. Escorted to the Governor's room at City Hall by a large concourse of citizens, he was presented with "a costly sword." Dinners were held in his honor, swords were given to him, and he was known as "Alvarado" Hunter to his dying day. A deputation of his fellow townsmen of Trenton received him at the railway and under military escort conducted him to his dwelling, whence in the evening a procession, civic and military, was formed which marched to the court-house where, with appropriate ceremonies, was presented to him a silver pitcher "in testimony of his gallant conduct."[22]

All these manifestations of public favor failed to salve the wound inflicted upon his proud spirit. From the day of his unjust punishment his downfall began to proceed slowly but surely to the end. "Poor Hunter, his fate was a sad one after all. Soon after his arrival at home his friends got him the command of the schooner *Taney* and in her he made a sort of roving cruise in the Mediterranean. He was not allowed a purser, and being extremely careless with his accounts found himself heavily involved upon his return to the United States. His friends came to his assistance and succeeded in getting him another command." So says Parker in his "Recollections." That this shortage involved no moral turpitude on his part and was due to inattention to duties of a novel description may be assumed, since Congress was easily persuaded to make good the deficiency in the government funds placed in his hands.

After a long period on waiting orders he was once more employed afloat. In 1853 he was given the command of the brig *Bainbridge* and sent to join the Brazil squadron under Commodore William D. Salter.

While Hunter's life was marked by many unusual happenings, the last episode is so extraordinary in character that it can only be explained on the ground that his mind had become unbalanced. So far as can be ascertained these are the facts in the case.

A difficulty of some kind had arisen at Asuncion, Paraguay, between the local authorities and the American Consul. Hunter,

[21] *Philadelphia Public Ledger*, May 29, 1847.
[22] Niles' Register, August 14, 1847.

who was nothing if not impetuous, begged Salter to let him go to the scene in the *Bainbridge* and help straighten out the matter. For reasons not given Salter refused the request. Not unlikely he feared that Hunter would be as much out of place in a diplomatic embroglio as a bull in a china shop. Chafing under this rebuff and irritated by Salter's unreadiness to exert pressure where pressure seemed to him needed, Hunter when next sent on a cruise deliberately squared away for home and deserted the squadron, something no really sane man could have done. Arriving at New York early in January, 1855, he issued an address in his defence to the American people.

The defence was characteristic of the man. "Vessels of war," he said, "are sent abroad for the sole purpose of protecting the lives, property and rights of our citizens; and any man who would consent to remain in command of a vessel of war where her use was perverted, *i. e.*, sent where she was not needed when great necessity existed for her elsewhere, would be acting unworthy of his position." [23]

The offence was too flagrant to be condoned and President Pierce ordered his name to be summarily stricken from the rolls. On January 29, 1855, he ceased to be an officer of our navy.[24]

After his dismissal he took up his abode in Philadelphia. The failure of his hopes and his great misfortunes weighed heavily on his mind, his hair became rapidly grey with grief and all his acts betrayed him to be a broken-hearted man.[25]

As might have been expected, he did not long survive his degradation. He was admitted to "The New York Hospital" February 28, 1856, as suffering from a disease contracted in Mexico during the war and there five days later his soul sought and found a peace he had not known on this earth.[26]

He is said to have left a wife and daughter who at the time of his death were in Spain.

The writer, having made earnest but hitherto unsuccessful efforts, will be glad to have from any source information which will enable him to get in touch with Hunter's descendants (if any there be) or with other relatives of his.

[23] *Pennsylvanian*, March 7, 1856.
[24] Navy Department Records.
[25] *Pennsylvanian*, March 7, 1856.
[26] *New York Times*, March 7, 1856.

Hunter's life was full of romance, the tragic element prevailing. It is impossible to review it without experiencing a melancholy regret that so much talent was wasted partly through his own fault, partly through the fault of others. His finer qualities were too fine not to have been better utilized.

In a brief obituary, a writer in the *Pennsylvanian* of March 7, 1856, says that

> no one who knew him had any but feelings of respect for him. His faults, if they were faults, were errors attributable to an impulsive disposition, and were far outweighed by his manly and solid virtues. He was as generous as brave, and impetuous. His melancholy demise will be regretted by all who knew him, as well as by those acquainted with his singular and romantic career.

The highest tribute to his ability is that of his colleague and squadron mate, Lieutenant W. H. Parker, who in his "Recollections" stated that Hunter "was one of the best naval officers of his day." Notwithstanding his faults and errors which were both many and grave, to look upon his end as it really was and to imagine what it might have been, had he not been so shamefully treated by Perry, makes one hope that never again shall such cruelty be inflicted on a gallant sailor, that for all time the one historic victim of unpardonable official injustice in the navy of the United States may still remain the intrepid "Alvarado" Hunter.

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THE EXECUTIVE OFFICER

By RICHARD WANE

The executive officer of the *New Mexico* was John Drake. When his orders were issued, there was considerable surprise that so young an officer should receive so important a billet. In fact, Drake himself was quite as much surprised as any one. He had expected to go to the battleship fleet as navigator of one of the ships, or possibly as gunnery officer. That he would be ordered to the very latest ship to go in commission as executive officer had not even entered his mind. As the two-year period of shore duty approached its end, he realized that once more he must break up his household in preparation for a three-year tour of sea duty. As inspection officer at Mare Island Navy Yard, he had become known to even the poorest paid workman as the most exacting man that had ever filled that position. The officers in charge of the manufacturing plants found themselves confronted with more rejected work during the first month of Drake's incumbency than they had had during a year of his predecessor's. There were a good many protests, of course, and a good many arguments, but no end of rejections, in spite of them. Costs mounted up. Also the manufacturing departments became more alert and careful. Then there was better work, costs went down again, workmen were discharged and leading men shifted. The rejections became fewer and fewer. Within a few months, Drake had accomplished a great deal for efficiency's sake, and the efficiency became steadily greater. But it makes enemies to disturb the routine; and while the various department heads recognized that much good had been accomplished, they were not sorry to see Drake go to sea.

The commandant's wife was at home. The veteran of more female wars than the commandant was of real wars, she had now arrived at that enviable social position as the first lady of the

navy yard. She no longer made a first call on new arrivals, for according to the dictates of custom, even newcomers must pay a first call on the commandant's wife. Her afternoons at home were always well attended. Every lady came, unless prevented from so doing by something extremely serious. True, they enjoyed themselves, but it was strategically fatal to absent oneself. Something must be discussed and it was much more comfortable to be present.

Mrs. Green, the constructor's wife, denied herself the refreshment table, a martyr to a new found cause of labor. She sat in a rocker, under a spreading palm, manipulating her knitting needles with intense application.

". . . . eight, nine, ten . . . . Yes, dear . . . . Oh! heavens, I've lost my stitches . . . . one, two, three . . . . yes, they say there is such a shortage of officers for the fleet that they are sending almost any one, even to the most important positions."

Mrs. Drake, nearby, heard the remark, and knowing that it was intended for her ears, would have liked to remark that probably the constructor's shops would welcome a change of inspectors. However, what she did say was, " Are you piping the collar in yellow, Mrs. Green? It's going to look so pretty."

" I'm so glad that you think so, my dear. I was thinking of using white, but, you know, it soils so easily."

All of which has very little to do with the story, except to show that when there are so many people to please, there are some who simply can't be pleased.

When an officer leaves his shore duty, he gives up his house and all that goes with it. His stateroom on board ship, sometimes hardly large enough for one, is supposed to take its place. Such incidentals as one's family have no standing in official circles. There was the packing to do. It would seem that a navy woman would become philosophical after a while and take moving as a matter of fact. But she doesn't. For her, each move has its heartaches, and its fears. In her treasures, each object has its associations and its memories of glorious trips or sordid ones to little boarding houses in the days when her husband's pay was small.

It was hard for Mrs. Drake to take down the first picture. With many a sigh, she gathered them up, and once the shock of the bare walls had passed, she went bravely at her task. Down

came the camel's-hair drapes John had purchased in Colombo, when the battleships had gone around the world. Among her possessions, too, was the cherished set of Canton china—every navy woman but the newest untravelled bride has her set. She wrapped each piece herself and packed it carefully in the very same barrel which had carried it there two years before. The tags from the army transport still stuck to the barrel's sides.

During the packing, the storekeeper's clerk came to check the furniture list, even to the garden hose and the iron ash-bucket.

When Drake came home for his lunch, they ate at a bare table in a still barer room.

"You will have to stay in Vallejo with the children," said Mr. Drake, "that is, until I send for you."

"But," protested Mrs. Drake, "your ship doesn't sail for several months yet, and I thought that we were going with you. It will be so hard to be alone after we have been together for so long."

"I know, dear, but I will have no time for you or the children at first."

His wife knew that if John Drake had decided that she must remain behind, it was useless to try to dissuade him. She had tried it before, but his decisions on domestic matters of major importance had always stood, and, as a matter of fact, had always turned out for the best. So she told him gently that she thought he knew best, and went to the window to hide a tear that would not stay back. Down at the entrance of the channel was the familiar dredger and she wondered idly if she would be able to see it from Vallejo. It was a part of the scenery, working day and night, week in and week out, fighting a draw with the silt of the Sacramento River, that a congressman might say proudly to his constituents, "See I am keeping our payroll intact. You must return me to Congress."

Drake lost weight the first few weeks on the *New Mexico*. Hard work and little sleep made their impression on his face. The ship must be ready to leave the yard at the time set. There were innumerable details to attend to, and new officers to get acquainted with and assigned to duty. A week before the time set for leaving the yard a little man with steel-grey eyes and a close cropped grey mustache came on board carrying a small satchel. To the officer of the deck he announced that he was Captain Smeed and he had come to report for duty and to take

command. His arrival, very indefinite—they understood that he was on leave of absence—had been expected daily. For over a week the morning orders had stated that the officer of the deck would keep a lookout for the captain. The officer on watch had thought at first that he was another of the vast army of solicitors to see the paymaster, but a more experienced officer would have recognized the penetrating gaze of the arrival as too characteristic of the navy to leave any doubts as to his identity.

Drake escorted him to his cabin, and a few minutes later the captain, in uniform, read his orders to command to the assembled crew. With the executive he inspected the ship, asking sharp questions, demanding to know whether this matter had been attended to, whether such a thing had been received on board. The tone of his voice boded ill for a negative reply. Those who knew Captain Smeed said that he was a martinet, and he was known by many. Intolerant of excuses, exacting in the performance of duty, quick tempered and nervous, he was held in fear and respect by those who had served under him. By those above him, he was regarded as a good man for the job.

There was the usual shaking down cruise, during the latter part of which a watch officer forgot to report eight o'clock to the captain. He was suspended from duty, reducing the watch to six. A boat left the ship three minutes behind schedule. The watch was reduced to five. An air of nervous expectancy permeated the wardroom. It got to be a frequent thing for the orderly to come into the messroom at lunch time. The captain wished to see Mr. Drake. When Drake returned to his lunch, the speculation and conversation would cease abruptly, and those nearest him would notice that his face was flushed and tense.

Always a quiet man, Drake would have nothing to say on these occasions. But from day to day his manner changed. The watch officers complained to each other that he supervised their duties with more attention than was necessary. Of an afternoon, after a night watch, when they had tried to take a nap, they were sent for, to be told about something of minor importance. When they had asked for permission to leave the ship they were asked about something or other which delayed their leaving. The paymaster thought that he knew his business pretty well and aired his grievances in the doctor's stateroom. That sage individual advised him to take his troubles to the captain, but after starting for the cabin, the paymaster thought the better of it and whirled about on his heel.

When the gunnery officer had asked for a special boat to take him ashore he was referred to the boat schedule. Down in the junior officers' messroom, the favorite subject was the executive officer. With the freedom of youth, they heaped invectives upon his head, and picked out different jobs for themselves on other ships.

If John Drake knew that he was not popular with the officers of the ship he did not show it. From early morning until after sunset he plodded away in his office or walked about the decks. After lunch or dinner, he would leave the messroom and smoke alone in his stateroom while he worked.

Down in the wardroom, Wadsworth, the senior watch, shook some tobacco violently from a little sack, closed it with his teeth, and spread the tobacco carefully in the hollow of the paper.

"It's a great life if you don't weaken," licking the paper along its length. "Boy, bring me a match! Where is that confounded boy? These boys are the limit. What they need is a few mid watches toeing a seam on the deck. Push the button, Cort."

Some minutes later Antonio Felipes, his black pompadour neatly brushed and highly perfumed, made his appearance.

"What in the blazes makes you so slow? You are not in the bosque eating rice out of banana leaves now, you know. You are in the great American Navy."

"De duktor he send me por his estuard."

"Well, you will be sending por de duktor, if you don't move a little faster," threatened Wadsworth.

"Woody," laughed Cortland, "you are getting irritable. Climate affecting you maybe."

"Climate nothing. My goat is walking abroad in the land."

"I would say that some one had corralled it, had tied it up and was feeding it tin cans."

"I guess you are right, and that some one has got about everyone's goat in his corral too."

"And here you are passing it right down the line. Regular little P. D. L. you are. What is the trouble this time?"

"Mid watch last night and not a bit of sleep before it. Of course I slept like a log this morning and who should pass through the messroom at 8.30 but little bright eyes, who invited my attention to the fact that the tables had to be cleared by 8.30 and would

I please arrange to get my breakfast more promptly in the future. Oh, this is the life!"

"Shouldn't let a little thing like that bother you. We are all getting it. Why last night, I, Lieutenant Cornelius Cortland, junior grade—for all time I guess—late commanding officer of the U. S. S. *Pampanga,* senior officer present, Southern Archipelago, was told to wear my cap, when I ventured on deck to the movies without it. How have the mighty fallen!"

"And I, Lieutenant Squirt McDougal," chirped up a little fellow in the corner, "lately detached from my soft job at the navy school on the Spa, with the rest of the mob—I, the mighty Squirt, famous shortstop on the Plebe baseball team, I got mine too."

"And what did the little runt do?" gleefully enquired Wadsworth.

"The little runt as you choose to call him, you ragged beanpole, was three minutes late in reporting his division this morning. Naughty! Naughty!" and he slapped his wrist derisively.

There was some comfort, at any rate, in knowing that the other fellow had received his share of attention; and, besides, talking things over with the other victims soothes the hurts to one's pride.

Of the captain they saw but little. At mast in the morning, he would fix his eye-glasses slowly to his nose, and with his head bent over the report book, he would gaze over the top of his glasses at the sailorman up for trial. After repeating the man's explanations with understanding and sympathy, to the complete satisfaction of that person, and be it said to his complete deception, he would snap out that he did not believe a word the man had said, and deliver upon him a punishment that made even the reporting officer wince at its severity.

At the first battle practice of the ship, the officers did their work through no desire to augment the fame of their captain, or add to the laurels, if there were any, of their executive officer. Relentlessly drilled and trained, they went to their stations on the day of the practice determined to do their best, because that was the way every officer of the navy was supposed to do his duty. As a matter of fact, they were not very optimistic over the outcome. For the most part, censure had been their portion and praise had not been known. The executive had that morning

told them that their men were not scrubbing their hammocks properly. And this on the day of target practice!

After the firing was over, it was whispered that the executive had stood behind the captain and when the latter had given the order to commence firing had quietly asked him to cancel the order. So surprised was the captain, that he did so, demanding to know the reason. Drake explained to him that under the rules, he did not have to fire until the ship had closed in another thousand yards and that he thought that the captain had known. Whether it was the thousand yards, or not—it certainly must have helped—there were 12 counted hits radioed from the towing ship. The captain tried to be affable, but he did so with difficulty. Certainly he was pleased, for this was undoubtedly the best shooting that had been done, with only three ships yet to fire. As for Drake, he sat down to lunch with his acquired reserve, and answered with monosyllables to the conversation of those about him.

For a new ship the *New Mexico* had done exceptionally well, and the captain knew that he would be among those present when the Selection Board next met. He offered his boat to the officers if they wished to go swimming, and warned several men at the mast instead of punishing them—something of a novelty to the men. It was noted that his orderly of late seldom appeared in the wardroom at lunch with the quiet summons. And it was noted that the executive appeared on deck less often to ask the officer on watch why he had not attended to some matter with more attention to detail. But for the most part he kept to himself, smoking more than he should have, talking to no one except on matters pertaining to duty. He understood in a vague sort of way that the officers regarded him in an unfriendly light.

There came an end to the drills and the maneuvers. It was over—all the hard work of the winter months in Cuba. The next day the fleet would sail for the north. Boats were secured for sea, gun shutters closed and all but one gangway taken in.

As Drake stood looking towards the shore line, the thought of his family awaiting him in the states caused his face to relax. The pleasure of anticipation was not to be denied him. To-morrow they would be at sea, and Fisherman's Point over there would be lost in the distance. The cable station with its lonely little family of three would be no longer under the big guns of the fleet.

As he gazed in that direction, a motor boat put off from the shore, and made for the gangway of the *New Mexico*. In the boat Drake recognized the superintendent of the station and his wife. With them was a lad of eight, and he noticed when they came on board that both the little fellow and his mother had been crying. He met them at the gangway, and in a few words was told by the father that the admiral had authorized the lad's passage to the states where he was to be placed in school under the care of an aunt. Drake looked over the permit and told them quietly that he would see that the boy was made comfortable on the trip.

The little fellow clung to his mother and manfully tried to hold back the big tears which filled his eyes. The mother gathered him in her arms and cried softly. The father, too, was filled with emotion as he said good-bye to his son.

"It's for the boy's good, mother, so you must not take it so hard." Turning to John Drake, who was gazing over the side, but seeing nothing, he said, "I trust, sir, that you will be kind to my boy. He will miss his mother very much and will be very lonesome."

"I shall do my best for the lad," Drake answered, and turning to the mother, "I have two boys at home, one about his age, and you may rest assured that he will be well taken care of."

With a final embrace the mother and father went down the gangway and into the little boat. Waving their hands as long as they could be seen, they looked longingly at the big ship that was taking their son so far away from them. They saw John Drake at the head of the gangway, the little fellow's hand clasped tightly in his, both waving their farewells to the little boat until it passed from view.

"Now let's take a look at the big guns," said Drake, "and by the way, what is your name?"

"John," answered the boy simply.

"Well now, isn't that splendid? That is my name, too. I think it's a pretty good name, don't you, John?"

The boy swallowed a big lump in his throat that would not stay down, and dashed a tear quickly from his eyes.

"Yes, sir."

"Short names are best, you know. Then the boys can't give you nicknames. Now when I was a little fellow like you . . . . "

"But my daddy says I am a big boy now," objected the boy.

"Why of course you are. But what I meant was that I was littler than you are when I was little. See?"

"Yes, sir."

"Well when I was little there was a boy who lived near me, whose name was Sylvester. The other boys called him Sylvest at first and then they called him Syl. One day one of the boys called him Silly and that was the only name he was ever called after that."

The little boy laughed and said he thought that Silly must be a very funny name to have when one grew up. The tears disappeared, and the natural interest of a child in new surroundings asserted itself. He asked a great number of questions which John Drake carefully answered. Hand in hand, they walked the deck, the boy talking with animation, Drake smiling and talking quietly to the lad.

"This is to be your home for the next few days, John," he told him, as they entered the executive's stateroom. "We will just take all of those things out of the top drawer now and put your things in there. How will that be?"

"That will be fine, sir, and Oh! look at the elephants," spying a herd of ebony elephants on the desk top. There was a very large one and a very small one and many sized ones between these two. Drake took them down, one by one, and gave them to the boy, who promptly sat on the deck and stood them in a row.

"And here is a camel to join the herd. But first I must wash the ink out of him."

"Do camels have ink in them?"

"Just this one. He was made to hold ink. All the real camels are full of water."

"Tell me about them, please," promptly demanded little John.

So John Drake sat on the edge of his bed and told the child all about camels and deserts and caravans. It was a long story, and when it was finished, the child asked to be told all about elephants. So Drake told him a tale of elephants and jungles that held the child in spellbound interest.

Over their cigars and their pipes, after dinner that evening, the wardroom officers talked of their plans for New York. Blue drifts of tobacco smoke floated over the messroom; the pianola pounded forth a syncopated Broadway hit; over in the corner, the doctor pondered over a chess board with the paymaster;

while at the other end of the table the chief engineer, with a pack of cards spread over the table, played his nightly game of solitaire.

At one end of the messroom, a Filipino boy spread clean sheets over a transom, folded the blanket on the foot and beat out a pillow.

"Better put some chairs alongside that transom," suggested the paymaster, "the boy might roll out."

But after the lights were out, John Drake came from his room in kimono and sandals and retired on the transom. Each night at sea he slept there, and when it was rough, he placed the chairs against the sides of the narrow transom to prevent his rolling out. On occasions, when the rough weather would awaken him he would go to his stateroom to take a look at the little boy lying asleep in the big brass bed.

Wadsworth went to the executive's stateroom to make a report the day before their arrival in New York. He looked through the partly opened curtain and saw the boy sitting on the deck, building a house with wooden blocks, which Drake had asked the carpenter to make. Close to him, on his knees, was John Drake, handing the blocks one by one to the child. Both were laughing, for the boy was having great fun.

"I don't want to go to school, Mr. Drake. I would like to stay right on here and be a sailor. Do I have to go to school? Why can't I stay right here with you? We could have so much fun. I would like to be on a ship with you all the time."

Drake looked at the boy and asked, half to himself, "Would you, John? I wish that others felt the same about it. But I guess they don't understand."

Wadsworth did not deliver his report. Instead, he turned quietly about and tiptoed down the ladder to the wardroom.

"You fellows, come over here a minute, I want to tell you something." When they had gathered about him, he talked earnestly to them for a long while and when he had finished they nodded their heads in assent.

"Woody, I guess you are right, we have considerable parallax in our visions and it has been getting worse. Our opinions need boresighting, too, I guess," said Cortland, in the vernacular of the navy.

When they sat down to dinner that night, with the little boy in his usual place next to Drake, there was less conversation than

usual. As the officers ate, they cast an occasional, expectant glance towards the center of the table. Presently Wadsworth tapped his fork against his water glass several times. A silence settled over the messroom.

Again he tapped the glass with his fork. "Ah-h-h," he sang.

"Ah-h-h," chorused the officers in the same pitch.

Then Wadsworth started singing and the others followed, until every voice had joined the chorus. Away down in the junior officer's mess and even in the captain's cabin above the words of the song could be heard:

With a neat Ha Ha, sweet Ha Ha,
Handsome and fair.
He is a corker, the girls all declare.
He's a high rolling lollydob swell.
Here's to JOHN DRAKE!
Say DON'T he look well?

The song had died down. At the end of the table sat John Drake, a great look of bewilderment on his face. Recovering his surprise, he smiled. It was a smile of great peace and happiness. He was amongst friends again. They understood.

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THE CAREER OF THE MEXICAN GUNBOAT *TAMPICO* [1]

By J. H. KLEIN, JR.

THE MUTINY

At the beginning of the year 1914 there were three Mexican gunboats on the west coast of Mexico, namely, the *Guerrero, Morelos* and *Tampico,* all under Federal control.

On February 22, 1914 (Sunday), at Guaymas, Mexico, about 8 p. m., while about half the officers and men were ashore, the executive officer (Lieutenant Malpica), the paymaster (Rebatet), and two engineer officers (Johnson and Estrada) took charge of the crew of the *Tampico,* arrested the captain and the chief engineer, and announced that the *Tampico* would henceforth be under the control of the Constitutionalists, or Rebels. The captain and the chief engineer were told that if they made no resistance they would not be harmed, and would, at the first opportunity, be turned over to the Federals. The mutiny, therefore, was accomplished without violence or bloodshed.

The *Tampico* immediately left Guaymas and stood to the northward intending to ram the *Guerrero.* Fortunately for the *Guerrero,* the *Tampico's* steering gear broke down and she then turned around to the southward and proceeded to Topolobampo, arriving there on February 24. The captain and the chief engineer were then placed aboard the S. S. *Herrerias,* and sent to Mazatlan, which at that time was in Federal hands.

[1] Nothing has heretofore been written concerning the career of the *Tampico* except the official reports from vessels stationed on the western Mexican coast at that time. It was my intention at first to compile an official report of her operations, but the tale seemed so interesting that the "compilation" gradually became a "story." The official reports of Admiral T. B. Howard (commander-in-chief), Commander G. B. Bradshaw (commanding *Yorktown*), and Commander N. E. Irwin (commanding *New Orleans*) were consulted and the data derived therefrom were used in producing the following story which is of historical value because of its accuracy.

The exact cause of the mutiny is not known. Various vague stories have been circulated concerning the true reasons therefor, but no one seems to know which, if any, of these may be true. One story has it that the Federals owed the crew 4000 pesos. Another story was told to the effect that Malpica had strutted the streets of Guaymas with a lady of questionable character (some say she was the captain's mistress) and as a punishment the captain sentenced Malpica to be reprimanded and to perform temporary duty with the army at the front. In order to avoid this sentence he was said to have hatched out the mutiny. By common repute the *Tampico* had been a very "gay" ship in her day, and I was told that frequently week-end parties had taken place at which both sexes were present aboard ship for several days at a time.

OPERATIONS AT TOPOLOBAMPO

On March 2, 7 a. m., the *Guerrero,* commanded by Capitán de Navío Torres, arrived off Topolobampo from Guaymas, and anchored outside the bar. At 10.30 a. m. the next day the *Morelos* arrived from Mazatlan, and anchored near the *Guerrero.*

At 9.37 a. m., March 4, the *Tampico* was observed standing down from Topolobampo. The *Guerrero* immediately got under way and opened fire as she entered the channel. The *Morelos* got under way as soon as practicable and followed along astern of the *Guerrero.* As soon as the *Tampico* cleared Shell Point she returned the *Guerrero's* fire, whereupon the *Guerrero* stopped, backed out of the channel, and presented her broadside to the *Tampico.* At that time the *Morelos* was about 800 yards beyond the *Guerrero* away from the *Tampico.* The firing continued until 10.05 a. m., during which time the *Guerrero* fired about 20 shells, the *Morelos* about six, and the *Tampico* 14, at a range of 8000-9000 yards. The firing of the *Guerrero* and of the *Morelos* was very wild. Comparatively speaking, the *Tampico* fired fairly well. Of her shots one was spotted 50 yards short, one 50 yards over, and one slightly to the left. At the conclusion of this brief engagement, the *Tampico* returned to Topolobampo and the *Guerrero* and the *Morelos* anchored outside, off the bar. No damage was done to any of the vessels. At that time the *Tampico* was said to have had about 70 tons of coal and about eight hundred 4-inch shells remaining on hand. At 8.40 p. m. the same day the *Morelos* left for Guaymas to coal and provision, returning to Topolobampo on March 9.

On March 13, at 8.50 a. m., the *Tampico* again stood out; the *Guerrero* and *Morelos* getting under way as soon as possible. The *Guerrero* opened fire at 9 o'clock. As soon as the *Tampico* cleared Shell Point, she opened fire on the *Morelos,* her first shell landing about 20 yards short, range 9000-10,000 yards. The *Morelos* returned the fire and began retreating to the southwestward, on which course she would have put the U. S. S. *New Orleans* in direct line of fire between herself and the *Tampico.* The *Tampico* then shifted her fire to the *Guerrero* and the *Guerrero* adopted the tactics of the *Morelos.* The *New Orleans,* of course, shifted berth as soon as possible. All firing ceased at 9.12, the *Guerrero* having fired 13 shells, the *Morelos* nine, and the *Tampico* six, at a range of 9000-10,000 yards, and no hits were made. It was again noted, however, that the gunnery of the *Tampico* was considerably better than that of either the *Guerrero* or the *Morelos.* The *Tampico* returned to Topolobampo while the *Guerrero* and *Morelos* anchored outside of the bar considerably to the southward of their previous anchorage. The *Morelos* left for Altata on March 30.

At 4.32 p. m. on March 31, the *Tampico* was again reported standing out. The commanding officer of the *Guerrero,* who was at that time returning an official call on the captain of the American cruiser, quickly returned to the *Guerrero* and got her under way immediately. The *Guerrero* took up a position off the channel broadside toward the *Tampico.* About 5.30 p. m., when the *Tampico* had reached a position abreast Shell Point, she opened fire on the *Guerrero* at a range of 9000 yards, and was immediately answered. About 6 p. m. the *Tampico* headed straight for the *Guerrero,* going right on over the bar until she grounded below the entrance. By 6.15 she managed to get off the bar and headed northwest, straight for the *Guerrero.* The *Guerrero* retreated but continued firing. At 6.30 the *Tampico* came about and headed back toward the harbor. Both vessels ceased firing at 6.40 because of darkness, the *Guerrero* anchoring off the bar while the *Tampico* proceeded on inside above Shell Point. During this engagement the *Tampico* fired both her 4-inch guns and one 6-pounder, while the *Guerrero* used her six 4-inch. The firing on both sides was very wild. The range varied from 9000 to 2000 yards. The *Tampico* fired about 160 shells (4-inch and 6-pounder) and the *Guerrero* fired 162 4-inch shells, of which 20 were shrapnel and the rest armor-piercing. Malpica later on told one of our officers

that the *Tampico* had been hit seven times during this fight, as follows: Two 4-inch shells passed through the officers' quarters under the poop, one 4-inch shell hit amidships near the water-line, four 4-inch shells entered the bow, one of which struck below the water-line and the other three hit near the water-line. There were no injuries to her personnel. The hits were stated by Malpica to have been made during the period while the *Tampico* was swinging around on the bar. Later on it was discovered that the *Tampico* had sunk inside the channel above Shell Point. The *Guerrero* was struck three times during this engagement; one 4-inch shell, armor-piercing, entered the starboard side of the berth-deck but did not explode, one 6-pounder landed on the skid frames amidships but did not explode, while another shell, either a 4-inch or a 6-pounder, cut a stanchion on the bridge. None of the crew on the *Guerrero* were killed, but a few suffered minor injuries. On April 10 one of our officers inspected the *Tampico* and reported that she was aground, heading out, inside Shell Point on the south side of the channel with water covering her entire main-deck. The two 4-inch guns were still aboard as was one of the 6-pounders in the waist, all the other guns having been sent ashore for use with the army. She still had 600 rounds of 4-inch ammunition left, most of which was under water.

On April 2, during the forenoon, the *Morelos* returned from Altata. The Federal gunboats did not know, but they shrewdly suspected, that the *Tampico* was aground, so, in order to find out, the *Morelos* was sent in close to the bar. At a range of 8000 yards she fired 11 shells at the *Tampico* and the *Tampico* fired eight in return, with no damage on either side.

On April 9 an aeroplane came out of Topolobampo and dropped five bombs near the *Guerrero* and *Morelos*, one of which fell close to the *Guerrero*. Small-arms were used in an endeavor to drive off the aeroplane, but because of her height this fire was not effective.

Later on in the month the Federal gunboats, having discovered the true situation of the *Tampico*, withdrew to other ports.

The *Morelos*, while in Mazatlan harbor, attempted to run well up into the inner harbor, and in doing so, ran high and dry aground. There she lay between the besieged Federals within the town and the Rebel besiegers around the outskirts until she was completely shot-up and destroyed by *both* sides.

The *Guerrero,* in the meantime, steamed up and down the coast between Guaymas and Mazatlan wherever she was needed.

The officers of the *Tampico* were making every endeavor to raise the ship, and put her in serviceable condition. A diving suit was finally procured, the holes under water plugged up, and eventually the ship was raised.

EVENTS PRIOR TO THE FINAL BATTLE

On June 11, 1914, the *Tampico* was reported as having been raised and made ready for sea. The commander-in-chief of the Pacific fleet (Admiral Thomas B. Howard, U. S. N.) was then off Mazatlan in his flagship *California* (now the *San Diego*). Several destroyers were kept with the flagship ready for dispatch duty. On Sunday, June 14, 1914, he received a report that the *Tampico* had that day sailed from Topolobampo. Fortunately for me, my boat (the *Preble*) was ready for a run, so I was detailed to find the *Tampico* at sea and then trail her. The *Preble* immediately got under way (about 3.30 p. m.) from Mazatlan, and started northward toward Topolobampo. The destroyer *Perry,* then at La Paz, was ordered to head for Topolobampo and report by radio to the *Preble* for further instructions. As I did not know what course or speed the *Tampico* was making, I simply proceeded slowly (about 10 knots) overnight to Topolobampo in the hopes of sighting her about daylight the next morning. During the night I twice headed to the westward to investigate passing ships. This set me about 10 miles to the westward of my original course. About 7.30 a. m., June 15, another ship was sighted on the port beam (to westward), hull down, and masts hardly visible. This vessel finally proved to be the *Tampico* herself. Had I not been set to the westward in looking over the two steamers during the night I would not have had the good luck to find the *Tampico* so quickly. Her position then was Lat. 25° 14′ North, and Long. 109° 07′ West.

I approached to within about two miles of her, and stopped. She also had stopped. As she did not get under way I approached to a position about a mile abeam of her in order to get a closer view, when I saw her lower a boat which headed toward the *Preble.*

The officer in charge of the boat (Rebatet) came aboard, presented the compliments of his commanding officer, and told me the following tale:

The *Tampico* had been under water about two months; she was raised, and thought to be ready for sea. On Sunday, June 14, she left Topolobampo under one boiler and proceeded to sea en route to Altata, Mexico. There she expected to retube her boilers and improve the condition of her machinery, and then start out after the *Guerrero*. After destroying the *Guerrero* she would break up the commerce on the west coast of Mexico, and, by cutting off the supply of provisions at Guaymas and Mazatlan would cause these two main Federal strongholds to fall into Rebel hands. The *Tampico* had proceeded only about 30 miles to sea when her one remaining boiler had burned out and she was now temporarily helpless. He thought repairs could be made, and that by sunset the *Tampico* would again be on her way to Altata. Her complement at that time consisted of the officers mentioned above, the following three additional machinists (Filiberta Vela, Porfirio Gonzales and Floreus Araryo), and about 56 men.

After Rebatet had returned to his ship I withdrew to a position about two miles to the northwestward of the *Tampico,* hove-to to await further developments, and sent a radiocode to the commander-in-chief informing him that I had found the *Tampico*. About 1 p. m. the destroyer *Perry* came in sight, received instructions, and also hove-to.

About 3 p. m. another boat put out from the *Tampico* and came to the *Preble*. The chief engineer (Johnson) and his senior assistant (Estrada) came aboard. They seemed to be in great distress and told me a tale as follows:

They could not repair their boilers; therefore they were at the mercy of the elements and would gradually drift ashore. They requested me to tow them to Altata—about 80 miles distant. (I declined on the grounds of strict neutrality.) They then begged me to send a radio to the American admiral, quoting their request. The captain of the *Tampico* had requested that I come aboard to see him.

I sent the radio to the commander-in-chief as they requested. When I showed them the rough draft of the message in radiocode they were very pleased because they had feared that I might send the message in plain English and that the *Guerrero* would pick it up and discover how helpless they were. And as they could not understand the message, they were certain that the *Guerrero* could not.

About 5.30 p. m. I boarded the *Tampico*. Captain Malpica excused himself for not having called, pointing to the bandages on his left foot. It seemed that about two weeks previously he had accidentally discharged his revolver into his foot, and as a result he could barely hobble about. During my conversation with him I gained a very favorable impression of his ability and determina-

tion. He spoke a little English, and, with my poor scraps of Spanish, we managed to piece out a very fair conversation. He seemed very grateful for my having forwarded his request for a tow to the commander-in-chief, and was anxious for me to inspect his ship thoroughly, to see for myself in what a pitiful condition she was. Accompanied by the executive and the chief engineer, I inspected the ship from truck to keel.

I was most anxious to see her, but as the inspection progressed I became more and more depressed. It was impossible to see such a helpless vessel, completely at the mercy of the wind and sea, totally unfit to steam or remain afloat, much less to commence the unequal struggle with the *Guerrero* which was imminent and inevitable, without a feeling of pity for these poor fellows. Above all, I could not suppress a feeling of admiration for this brave man, which increased at the end of the inspection, when upon asking Malpica what he would do if the *Guerrero* appeared, he defiantly answered: "I'll fight her and sink her if she will only come within range of my guns." These words could only come from either a fanatic or a remarkably determined man.

Conditions aboard that ship cannot be properly expressed in words. The captain's cabin was littered with boxes of stores, provisions and small-arm ammunition. These cases looked as if they had been thrown aboard from a great height and then left scattered, bulged and broken as they fell. The furniture was dilapidated and musty. A steel safe and two magnificent brass candelabra stood among the broken cases. A large quantity of alcohol was said to have been stowed beneath the captain's cabin. The officers' quarters were in the same sad condition.

Out on the main-deck was strewn every imaginable variety of splinter-producing litter. Broken cases, bales of hay, ammunition boxes, and Lord only knows what not scattered all about. Among it all, three cows sauntered aimlessly around assisting in messing up the decks.

Four 6-pounder semi-automatic guns had originally been installed in the waist. All these guns were now missing, and only the broken pedestals remained.

On the skid-beams overhead were the pulling boats which were a long way from being seaworthy or clean. The radio shack, a wooden house about 5′ by 5′ by 8′, was also mounted overhead between the boats. The ship carried an aerial, but there were no radio instruments aboard. Had a shell exploded among these

boats the fragments and splinters would have killed or injured every one on the main-deck. The bridge was a small, rickety affair. On the port side a small machine gun had been temporarily mounted. About 30 boxes containing the loaded belts for this gun were piled about on the bridge.

The *Tampico* had a raised deck forward and aft, on each of which was mounted a 4-inch rapid-fire gun. The officers said that these guns were unreliable, and that they expected trouble with them. A casual examination showed that the breech blocks were loose on their hinges, the rifling badly eroded, and that there was much lost motion in the training and elevating gear. The sights were of a very antique design. Not only did they have much lost motion, but the cross-wires in the rear sight could not be brought to coincide with the front sighting notch. In my opinion these guns were more dangerous to their own crews than to the enemy.

Ammunition was scattered all about the forecastle and poop. Some of the shells were lying out exposed to the weather and some were still in their boxes. Shrapnel, blind shell, and armor-piercing shell were mixed promiscuously, although there seemed to be more shrapnel than any of the other. As this ammunition had been under water for two months I had grave doubts as to whether it could be fired at all, much less with any degree of accuracy. I was told that they had but 100 rounds of 4-inch shell of all kinds in the entire ship. Inside the forecastle on the main-deck level were two 6-pounder semi-automatic guns. These seemed to be in fair condition and had an unlimited supply of ammunition. (Only one of these guns could be used in the battle next day as the *Guerrero* did not steam over on the port side of the *Tampico*.)

Below decks the same disorder and dirt was in evidence. Broken wooden fittings were piled up in all corners, a fine opportunity for fire in action. The old shot holes which had been received in previous engagements were plugged up with makeshift leak-stoppers. The officers stated, however, that she was dry and water-tight.

The engine-room was indeed a sorry spectacle. Everything seemed to be rusty and out of commission. The main engines themselves were rusty and filthy, but they had succeeded in going about 30 miles with them at very slow speed. The generator was hopelessly ruined by the salt water, so they had neither electric power nor lights, except kerosene lanterns. Several pumps were said to be in fair condition. The ice-machine was not working.

but of that they had little concern at this time. The evaporator, they said, could be used if they could only get steam from the boilers.

The two Babcock and Wilcox boilers were dead, the fronts of the casings were off, hand-hole plates removed, and many tubes exposed to view. Salt crystals hung from the tubes, the steam piping, the fresh-water piping, and gauge glasses. According to the chief engineer about 500 tubes needed plugging. They were using wooden table legs to make these plugs. Several firemen while hoisting ashes were singing away as if they were really happy. The executive told me that the engineer officers had been in the fire-rooms constantly to tend the steaming boiler, but that during the temporary absence of one of them, the inexperienced firemen had carelessly ruined the boiler. This defection on the part of the engineers was evidently one of the bones of contention aboard the ship, and caused the reprimand of which I shall tell later. The executive said that the engineers' force was composed of five engineer officers and 15 "shovelers" (as he expressed it). It seems that they had no artificers, machinists'-mates, oilers, or water-tenders, and that the "shovelers" were very inexperienced.

The crew were a hard-looking lot of Mexicans. They seemed to be but poorly disciplined, if at all, as during the inspection they swarmed about and would not give gangway to the officers until spoken to very sharply. One of them in fact lolled in a broken-down armchair on the starboard side of the quarterdeck, smoking a cigarette in a most nonchalant manner. Many of the crew wore bandages—evidences of previous engagements. They were poorly clothed, some of them wearing hardly any clothes at all. Inquiries among the various officers as to the number of men in the crew brought answers ranging from 38 to 56. It seems none of them knew exactly how many men were aboard. By checking up the prisoners and wounded I estimated that the crew consisted of:

1 commanding officer,
1 executive,
1 chief engineer,
1 assistant engineer,
3 machinists,
15 in engineers' force,
14 in seaman branch,
25 soldiers.

61 total.

After finishing the inspection, I had another conversation with the captain in his cabin. He seemed anxious for a reply to my radio in regard to towing him to Altata, and was disappointed when I told him that I hardly expected one before daylight. Before I left he insisted that I have a drink with him of the vilest liquor I have ever tasted. He seemed loath to have me go, and made me promise that I would come aboard at noon the next day to sample a cocktail for which he claimed exceptional virtues. (The poor man had crossed the line by noon the next day.) I inquired about his supply of food and water and he told me that he could hold out for at least two weeks.

During the night all the vessels drifted in various directions. The *Perry* and *Preble* took position to the westward of the *Tampico* so that in case of any grounding the *Tampico* would ground first and give us a chance to clear out.

About 10 p. m. we sighted a vessel approaching from the southward. She steamed to within two miles of us and then sheered off to the westward. She was probably some coastwise trading vessel, but of this I am not positive. The three ships must have presented a very queer appearance. The *Tampico* was burning several dim oil lamps which could hardly be made out at a distance of one mile. The *Perry* and *Preble* had their running lights on and also the white masthead lights. In addition, being under way, but stopped, we had our red speed-indicator lights on the foremasts burning. A merchantman on coming upon such a combination of lights in a place usually and supposedly clear of all ships, lights, etc., must certainly have been surprised, and I cannot blame her for making a sudden change of course to westward in order to give us a wide berth.

During the night we intercepted a radio from the *New Orleans* (then south of Guaymas) to the commander-in-chief, stating that the *New Orleans* was trailing the *Guerrero* on a southerly course. From her 8 p. m. position I figured that the *New Orleans* and the *Guerrero* would pass us about 7 a. m. the next day. To my mind that information sealed the *Tampico's* fate. We, on the *Preble*, discussed the impending battle, and I am sure none of us slept very soundly during the night. It was a very peculiar feeling to know that the *Guerrero* was bearing down on the helpless *Tampico*, and yet we were unable to inform the *Tampico* of the surprise in store for her. However, my orders were to watch and wait and to report everything, but to assist neither side.

Some time during the night the *Tampico* drifted over a 22-fathom shoal and dropped both her anchors. Her position on anchoring was Lat. 25° 28′ 30″ North, Long. 109° 18′ West, and it was there in that position that she was sunk.

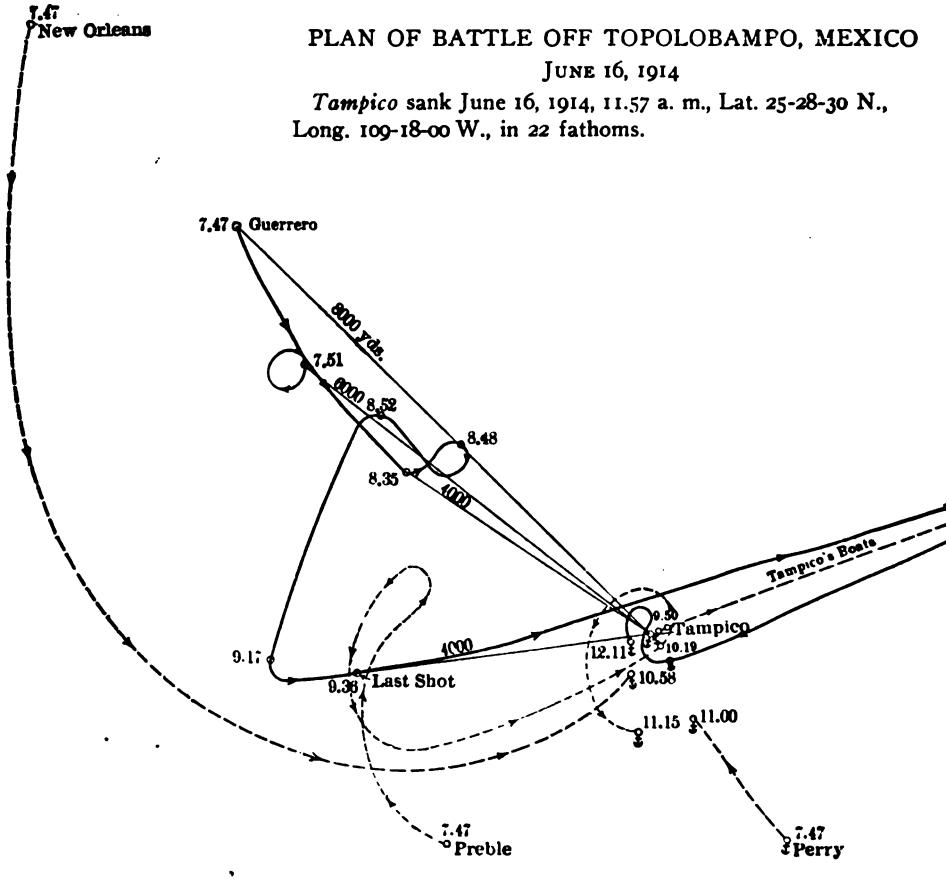
About daylight the next morning, June 16, we sighted two vessels to the northward bearing down on us very rapidly. About 5.30 they were recognized as the *Guerrero* and the U. S. S. *New Orleans* (Commander Noble E. Irwin, U. S. N., commanding). The *Guerrero* stopped and cleared for action, and about 7 a. m. stood down toward the *Tampico* to commence the fight.

The *Tampico* hoisted her flag to the gaff—evidently the only preparation they made for action. This flag was an enormous Mexican national ensign, and all out of proportion to the size of the ship. And then commenced the action between the two ships, each flying the *same* national colors.

The position of the combatants and spectators at about 7.45 a. m. is shown on the accompanying sketch. The officers and crews of our vessels were very excited, the men swarming all over the topsides and rigging, armed with cameras and binoculars. The majority were in deep sympathy with the *Tampico,* not because they had any real preference for that vessel against the *Guerrero,* but because all humanity unconsciously sympathizes with the "under dog." During the action whenever the shells from the *Tampico* landed near the *Guerrero,* our men cheered, and, conversely, groans were heard when the *Tampico* was hit. The flow of "sailor-man's repartee" was particularly strong, especially when the men criticized the poor gunnery of each side. After the vessels had been "expending ammunition" for an hour or more with little result, the seriousness of the encounter was lost, and much foolish comment was heard. Shells falling beyond the target were called "home runs" while those striking closer were called "triples," etc. On one occasion, when one of the *Tampico's* shells fell about one-third of the way to the *Guerrero,* the helmsman leaned over to the quartermaster and said, "Gee, that wasn't even a respectable bunt," to which the quartermaster replied, "Those boobs on the *Tampico* will starve to death before the *Guerrero* hits her." During the battle the *Preble* ran back and forth midway between the two firing ships, at right angles to the line of fire, and about two miles clear. Whenever the *Guerrero* came about we did likewise, following each of her movements, but being from one to two miles south of her, we interfered in no way.

The weather was ideal, clear and warm, with just sufficient breeze to blow the smoke clear of the guns. The sea was almost dead calm.

PLAN OF BATTLE OFF TOPOLOBAMPO, MEXICO
JUNE 16, 1914
Tampico sank June 16, 1914, 11.57 a. m., Lat. 25-28-30 N., Long. 109-18-00 W., in 22 fathoms.



In order that my impressions of the battle would not later on become confused, I had a yeoman stand near me with a stopwatch, pad and pencil and jot down all the steps of the engagement (I dictated to him as they occurred), noting the time of each event. In this way "imagination" was eliminated.

THE FINAL BATTLE

True to his word, Malpica was the first to begin the engagement, firing his after 4-inch gun at 7.47 a. m. (Mazatlan time) at a range of about 8000 yards. This shell fell 400 yards short. The *Guer-*

rero promptly answered with one gun, the shell falling 1000 yards over. By 7.50 the engagement had become general. The *Guerrero* was using all of her 4-inch guns, while the *Tampico* could use only her two 4-inch and the starboard 6-pounder. Whether the *Tampico* ever fired her machine gun or not is questionable, as the range was never reduced sufficiently to enable the machine gun to reach the *Guerrero*. The firing on both sides was very erratic. There seemed to be no attempt made at spotting. At 7.51 the range was reduced slightly and the *Guerrero* changed course to starboard, *i. e.*, away from the enemy. At 8.02 the *Guerrero* stopped temporarily, the starboard battery presented to the *Tampico*, range estimated about 6000 yards. Between then and 8.11 the firing was very poor. Neither ship had as yet made any hits. Some of the *Tampico's* shells were falling about half way to the *Guerrero*, this no doubt being due either to the defective, wet ammunition or to the failure of the elevating gear. (See story of men, noted near the end of paper.)

At 8.13 both vessels ceased firing for three full minutes, and then the *Tampico* opened again. It was at this time that we noted the manner in which the *Tampico's* guns were being served. It seemed to us that the gun's crew would load the gun and lay it in the general direction of the enemy. Then the men would back away from the gun and lie down flat on deck while some one pulled the firing lanyard. I do not believe that any attempt was made to keep the guns continuously on the target while firing. One officer on the *Preble* stated that he had observed the same procedure on the *Guerrero*, but I saw at various times the pointer at the gun when the *Guerrero's* guns were fired.

At 8.20 the *Guerrero* came about, presenting her port broadside to the enemy. Firing was speeded up, but all shells were falling short. Evidently when they changed course away from the enemy, thereby increasing the range, they failed to change the setting of the sights. About 8.22 the *Guerrero* began easing toward the *Tampico* very slowly and at 8.24 made her first hit—after 30 minutes of firing. This shell struck the main-deck between the mainmast and the poop. A large cloud of white smoke arose, but no damage seemed to have been inflicted, and, as there were no guns in that part of the ship, the *Tampico* did not suffer any reduction of gunfire thereby. This shell was evidently a shrapnel. (Later on I was told that the *Guerrero* had fired practically all shrapnel throughout the engagement.) Firing continued as before, *i. e.*, very slow, and correspondingly ineffective.

Before the fight the *Tampico* had lowered all her boats and had secured them to her port lower boom on the unengaged side. At 8.34 one of these boats got adrift and floated clear of the ship.

At 8.35 the *Guerrero* had advanced to a range of about 4000 yards and then changed course to port, *i. e.*, away from the *Tampico*. This period marks the least range of the entire two hours of fighting. It is probable that at this stage the *Guerrero* was struck. We discovered later that she had been hit twice during the engagement, but as neither hit did any damage we did not know at exactly what time they were made. The *Guerrero* came about at 8.40 and headed for the *Tampico* again, and at 8.48, after one hour of fighting, she scored her second hit. This shell carried away the *Tampico's* gaff and with it went the immense flag previously mentioned. No physical or material damage resulted, but the loss of the *Tampico's* colors no doubt cheered up the *Guerrero's* crew. Two minutes later, at 8.50, the *Guerrero* came about and headed away from the enemy.

During the entire engagement the *Tampico* was at anchor. She however resorted to a ruse which may or may not have gained its end. Oily waste and other combustibles were burned in the smokepipe in the attempt to lead the *Guerrero* into thinking that the *Tampico* was actually under way. This could hardly have deceived any one, but it does seem odd that the *Guerrero* failed to steam across the *Tampico's* stern in order to gain a greater danger space for her guns and to reduce the effective fire of the *Tampico* to the lone 4-inch gun mounted on her poop.

The *Guerrero* came about and presented her port side to the enemy at 8.52, at an estimated range of 5000 yards. I noted the firing interval at this stage and found that the *Guerrero* was firing at the rate of two shots per minute (six guns) and the *Tampico* at the rate of one shot every two minutes (three guns). No doubt the *Tampico's* defective ammunition did not fit in the guns, necessitating a waste of a great deal of time in trying to select brass cartridge cases that would go all the way into the chamber and permit the breech block to be closed. Furthermore, as they originally had only about 100 rounds of 4-inch, they may have been trying to save their supply until the *Guerrero* should reduce the range.

Two more of the *Tampico's* boats got adrift at 9.01. The *Guerrero*, at 9.07, probably angered by the long-drawn-out proceeding, headed for the *Tampico* and began to fire salvos. The

mean point of impact was "The Gulf of Lower California" with the distance from the target expressed in "miles" instead of in "yards." One salvo was spotted as 500 yards over, 1000 yards over, and 2000 yards over, and this was a representative salvo. None of the salvos straddled the enemy. This erratic firing provoked much mirth among the *Preble* crew and there were many cries to the *Tampico* to "Soak her now!" The *Guerrero,* still heading for the *Tampico,* slowed down at 9.14 until she barely had steerage way on, and at 9.17 she turned away to port.

After the engagement I discovered that the *Tampico* had been hit in the starboard bow close to the 6-pounder gun, and that the shell had exploded inside the forecastle. That hit must have been made at about this period, but we could not see it from our ship. The forward 4-inch gun did not fire after this, and it is very probable that the exploding shell crippled that gun, possibly destroying its foundations. At 9.18 a shrapnel exploded just short of the *Tampico,* midway between the smokepipe and the forward bridge. This shell did not seem to hurt the ship itself, but the fragments probably killed some of the crew.

At 9.20 flames and smoke were seen to spring from the *Tampico's* quarterdeck. How they attempted to put this fire out I do not know as they had no steam on the ship and consequently would have no pressure in their fire-mains. Incidentally, the alcohol stored beneath the captain's cabin must have given them cause for anxiety. At 9.42 the *Tampico's* gasolene-launch and one pulling-boat came around her bow and secured along her starboard (engaged) side amidships. These boats remained there but a minute and then returned to the port side. Preparations for abandoning ship were evidently in progress. At 9.45 the flames on the *Tampico's* quarterdeck flared up with renewed vigor. Smoke poured forth in large volumes and completely enveloped the after gun. In spite of this the Rebels fired two more shots from that gun, even though I could not see the gun through the smoke and flames. One of the gun's crew stood up on the burning poop and defiantly waved a large flag. The *Guerrero* continued firing until 9.50.

It was then that we saw the *Tampico's* crew in their boats, the gasolene-launch towing one pulling-boat, heading for the shore. After the ship had been abandoned, the *Guerrero* ceased firing and proceeded at full speed for these boats in order to intercept them before they could get into shoal water. The battle proper ends at this time—9.50.

EVENTS IMMEDIATELY AFTER THE BATTLE

After a chase of about half an hour the *Guerrero* caught up with the two boat-loads of the *Tampico's* men. As there was no further hope for the boats to escape they pulled along side of the *Guerrero* and the prisoners were taken aboard. While the prisoners were climbing up the *Guerrero's* ladder, Malpica, standing up in his boat, in plain sight of everybody on the *Guerrero,* calmly placed his revolver to his head and shot himself, dying almost instantly. The *Guerrero* half-masted colors immediately, all the American vessels following suit. The commander of the *Guerrero* sent a radio to the commander of the *New Orleans* thanking the American vessels for half-masting colors "in honor of the death of Malpica." The *Guerrero* returned to a position about 400 yards to the southward of the *Tampico* and anchored. Boats were sent out from the *Guerrero* to the *Tampico* to investigate conditions aboard the latter ship, and a tow-line was passed from the *Guerrero's* stern to the *Tampico's* bow. The rescue party, however, reported that the *Tampico* could not be saved, and later on the tow-line was cut.

When the *Guerrero* ceased firing and started in pursuit of the boats, the American vessels closed-in on the *Tampico,* in order to render such assistance as might be needed; the *Preble,* happening to be the closest at that time, was the first to reach the spot and steamed to within 50 yards of her bow. There were several men rushing about her forecastle waving white rags. They climbed down the port boom and down the anchor cable, but refused to slide into the water and swim to the *Preble.* In the meantime the fire was spreading and the fixed ammunition was going off in all directions. Small-arm ammunition cracking away sounded like a machine gun. Suddenly the after magazine blew up and 4-inch shells were sent in all directions. Several of these were plainly seen and heard as they flew through the upper rigging of the *Preble.* At this juncture the *New Orleans* appeared and took charge of the situation. She lowered two boats which went close under the *Tampico's* bow and rescued the men who were jumping into the water close to the boats. Later on the *Guerrero's* boat picked up the last man who was floating about on a plank after the ship had sunk. That was Rebatet, the ex-paymaster, severely wounded.

While the *Preble* was close aboard the *Tampico* I noted the following conditions:

The main-deck aft had caved-in and the stern of the ship was a seething cauldron.
The starboard side of the forward bridge was wrecked.
Two corpses were plainly visible on the port side under the bridge.
The main-deck was covered with splintered gear fore and aft.
Shrouds of the mainmast were hanging over the stern.
The foretopmast was pierced, but the stick was still standing.
Gaff and colors were shot away.
Part of the aerial was carried away.
The after 4-inch gun had fallen down into the fiery furnace.
Rolls of paint were hanging from the outer shell aft clear down to the water-line.

The *Tampico* gradually listed to starboard, as the water came up higher and higher. At 11.35 the water had reached the main-deck and began to flow aft until finally it had risen sufficiently high to flow over the hatch coamings and down into the hole in the stern. At 11.57 clouds of steam arose, showing that the water was now flowing into the hole and the end was near. She heeled to starboard sharply, and, at 11.57½, her stern sank very suddenly lifting her bow up to an angle of about 45°. There she held for an instant, the imprisoned air in her bow buoying her up. The air-pressure now began to rip up the planking in the main-deck and spouts of water spurted up as the seams parted. The bow came up vertically, and then, with very little commotion, the ship slid down stern foremost under the surface. There were very few bubbles and no suction. All that remained of the *Tampico* were a few bits of floating wreckage. She sank in 22 fathoms.

About 1 p. m. Captain Irwin called on the commanding officer of the *Guerrero* and took me along with him. We met the captain and the executive officer, and had a short talk with them. They showed us the two holes in the *Guerrero,* which had done no damage to either the ship or personnel. There was no gayety nor any feeling of exultation aboard that ship; on the contrary, a funereal air seemed to pervade everybody and everything. They were very sorry that this battle had had to be fought, and especially regretted the death of Malpica. As they said, Malpica had been respected and admired by all the officers of the *Guerrero,* many of whom had previously served with him. They were profuse in their praises of his courage and ability and mourned his loss as that of a true friend instead of a defeated enemy.

The injured aboard the *Guerrero* were being attended by Surgeon McLean, U. S. N., of the *New Orleans,* assisted by the medical officer of the *Guerrero.*

The captain of the *Guerrero* stated that the prisoners would be treated kindly and I doubted very much if he would turn them over to the Federal authorities when he reached Mazatlan.

REVIEW OF THE BATTLE

The *Guerrero* used six 4-inch guns throughout the battle, and fired practically nothing but shrapnel. We were told that she was endeavoring to fire high in order to kill off the personnel and force a surrender rather than to injure the ship. The *Tampico* used her two 4-inch guns and her starboard 6-pounder, firing common, armor-piercing and shrapnel indiscriminately. The *Guerrero* fired 263 rounds and the *Tampico* 75. The *Guerrero* was struck twice, as previously noted. Her personnel escaped injury.

The *New Orleans* took six men off the *Tampico,* of which two were wounded; one of these died the following day, the other five were taken aboard the *New Orleans* to Mazatlan and, as I understand, eventually transported to the United States. The captain of the *Guerrero* did not request the surrender of these men from the *New Orleans* to the *Guerrero.* Of these six men one was a seaman (second-class), two were petty officers (second-class), and three were privates of infantry (*soldados*).

The captain of the *Guerrero* stated that of the men taken prisoners from the *Tampico* 12 were seriously wounded, and 12 to 15 more suffered minor wounds.

Later on I interviewed these prisoners aboard the *New Orleans.* The two petty officers (Francisco Alvarez, B. M., 2 Cl.; and Aciano Lamos, B. M., 2 Cl.), agreed in their tales, the substance of which is quoted:

Captain Malpica took charge of the after 4-inch gun. The executive (Rebatet) similarly took charge of the forward 4-inch gun. The chief engineer (Johnson) was on the bridge with the machine gun. Throughout the fight the soldiers were a source of considerable trouble, as they did not know the ship and the guns, and had no taste for fighting aboard ship. They were the first to abandon the vessel. The *Tampico* was hit above water five times:

(a) One shell killed two men, Luesa and Salvador.

(b) Another hit did no damage except to carry away the colors.

(c) The third hit killed one *soldado*, and probably was the shell that wounded Rebatet.

(d) The fourth hit killed two men, and seriously wounded Estrada. During the engagement Malpica had rebuked Estrada for carelessness in allowing the boiler to be burned out, telling him that he was the direct cause for the condition in which they now found themselves. Estrada, wounded, went into the radio shack and, with his head between his arms, cried over his reprimand, and died in that position. It was also reported that he had shot himself while in the radio shack. His body sank with the ship.

(e) The fifth hit did no damage.

In addition to these hits, these men claimed there were seven hits in her stern under water. I do not believe it possible that seven shells could have struck there without our seeing some of them as they struck. These shells were said to have exploded in the ship, setting fire to the alcohol and thereby starting the fire which finally caused her to sink. When the ship was abandoned Malpica was the last to enter the boats. These men and the other men who had been rescued by the *New Orleans* had gone below to plug up shot-holes under water. They had been called to come on deck to abandon ship, but they thought there was no special hurry and delayed, and when they did finally come on deck the boats had shoved off. They did not blame Malpica, but took all the blame on themselves for having been abandoned aboard ship.

The elevating gear on the after gun had broken down during the action. The forward 4-inch gun was disabled soon after the firing started. They had fired all their ammunition that was fit for firing before they left the ship and then abandoned because the fire could not be checked and the water was rising in the hold. Before abandoning her the crew opened the sea-valves. To the best of their knowledge, there were only five men (all dead) aboard ship when she sank.

To sum up the fate of the officers and men:

Malpica (commanding) committed suicide.

Rebatet (executive) wounded in chest and leg; found floating on plank; was cared for on *Guerrero*, and probably survived.

Johnson (chief engineer) prisoner on the *Guerrero*, uninjured.

Estrada (assistant engineer) died in the radio shack and body sank with the ship.

Vela, machinist
Gonzales, "
Araryo, "
} Fate unknown; probably prisoners on *Guerrero*.

Of the crew, six were prisoners on the *New Orleans*, of whom one died. There were about 48 prisoners on the *Guerrero*, of whom 12 were seriously injured and 12 suffered minor injuries. The remainder, about five, were undoubtedly lost with the ship.

PHOTOGRAPHS

The accompanying photographs are very indistinct. The originals, filed in Office of Naval Intelligence and in the Department, are not much better.

FIG. 1.—*Tampico* (right) and *Guerrero* (left). *Guerrero* returning to *Tampico* after capturing boats. (Photograph taken from the *New Orleans*.)

FIG. 2.—*Tampico* afire. Note explosion of ammunition. *Guerrero* on extreme right. *Preble* seen over *Tampico*. *New Orleans*' boats in foreground, one alongside starboard bow, the other on right edge. (Photograph taken from the *New Orleans*.)

FIG. 3.—*Tampico* ablaze. Taken shortly after she was abandoned. *Preble* on left. (Photograph taken from the *New Orleans*.)

FIG. 4.—*Tampico*, view of, close aboard. (Photograph taken from the *New Orleans*.)

FIG. 5.—*Tampico*, view of, close aboard. *New Orleans* on extreme left. (Photograph taken from the *Preble*, just after magazine explosion when the *Preble* was backing away.)

FIG. 6.—*Tampico* sinking. *Preble* on right. *Guerrero's* stern on extreme right. (Photograph taken from the *New Orleans*.)

No. 316-2-328-JHK-WLM.

U. S. S. "PREBLE."
PICHILINQUE BAY, L. CAL., MEXICO.
June 17, 1914.

To: Commander-in-chief, U. S. Pacific fleet.

Via: Commander, torpedo flotilla, Pacific fleet.

Subject: Report of operations.

Reference (a): Flotilla commander's letter No. 705-103 of 6-14-14 and commander-in-chief's first endorsement of same date.

Inclosure (A): Copy of rough notes made during engagement of *Guerrero* and *Tampico*.

1. In accordance with provisions of reference (a), I left Mazatlan at 3.30 p. m., Sunday, June 14, and headed for Topolobampo.

2. During Sunday night I sighted a vessel to westward and pursued her until satisfied that it was not the *Tampico*. I then set a new course toward Topolobampo.

3. At daylight, Monday, June 15, I sighted another vessel to westward which I pursued until I discovered her to be a mail steamer. I then again set a new course toward Topolobampo.

4. About 7.30 a. m., I sighted a vessel to westward which I finally made out to be the *Tampico*. Her position then was Lat. 25° 14′ North, Long. 109° 07′ West. The events cited in paragraphs 2 and 3 are given in order to explain how I came to discover the *Tampico* so far to westward of my original course.

5. The *Tampico* seemed to be under way, so I stopped to southeastward (2 miles) waiting for her to pass. As she did not make any headway, I steamed toward her so as to clear her about one mile to eastward. When almost abreast of her, she lowered a boat which headed toward *Preble*, so I hove-to.

6. The executive officer of the *Tampico* came aboard and from him I received the following information:

> "*Tampico* had been sunk at Topolobampo by *Guerrero*, and, after lying under water about two months, was raised and made ready for sea. On Sunday, June 14, 1914, the *Tampico* left Topolobampo under one boiler and proceeded to sea en route to Altata, Mexico. There she expected to retube her boilers and prepare to give battle to *Guerrero*. After proceeding to sea about 30 miles, her one remaining boiler was burned out and she was now temporarily helpless. Repairs would be made and she would proceed to Altata by sunset. Her complement consisted of 56 men and the following officers:
>
> Captain Hilain Rodriguez Malpica (erstwhile executive of *Tampico* while still under Federal control).
>
> Executive officer Augustin V. Rebatet (erstwhile paymaster).
>
> Chief Engineer David Johnson (erstwhile chief engineer), is real Mexican despite his name.

Machinists:
Ramon Estrada.
Filiberto Vela.
Porfirio Gonzales.
Floreus Araryo."

7. After Rebatet returned to his ship I withdrew to a position about two miles to northwestward and hove-to.

8. The *Perry* joined *Preble* at 1 p. m.

9. About 3 p. m., same day, the chief engineer (Johnson) and the first assistant engineer (Estrada) came aboard. They gave me the following information:

> "The repairs to the boilers could not be made. The *Tampico* was helpless in regard to her boilers; therefore, she would have to drift ashore. They requested me to tow them to Altata, and when I refused they begged me to wire the commander-in-chief and request a tow, which request was complied with. They invited me to visit their ship."

10. About 5.30 p. m., I went aboard *Tampico*. Their commanding officer excused himself for not calling on me because of a wound in his left foot (where he had accidentally shot himself while cleaning his revolver) and therefore could not walk. In reply to his numerous inquiries I explained to him my mission, assured him that my radios would be sent in cipher, emphasized the fact that I was a neutral and could not therefore assist him in any way as long as his vessel remained afloat, and that I would notify the commander-in-chief of his helpless plight and could do nothing without commander-in-chief's sanction.

11. The commanding officer then presented his officers and requested me to inspect his ship for my own information, which I did and found the following conditions to exist:

(a) The ship, as a whole, was a mass of wreckage, was dirty, filthy and unsanitary, and the poorest excuse for a man-of-war that could possibly be imagined.

(b) The captain's cabin was littered with cases of stores, provisions and small-arm ammunition.

(c) The officers' quarters were in the same condition.

(d) The main-deck was strewn with every imaginable variety of splinter-producing litter. Three live cows were roaming the decks scattering fodder, etc., all over the ship.

(e) The four 6-pounder semi-automatic guns which were originally mounted on main-deck were now missing.

(f) The boats on the skid-beams were unseaworthy.

(g) An aerial was in position, but the radio house (a wooden shack wounted on skid-beams) contained no instruments.

(h) On the port side of the bridge was mounted a machine gun. About 30 boxes of loaded belts were scattered about on the bridge.

(i) Inside the forecastle, where the crew was temporarily housed, I saw two 6-pounder semi-automatic guns, apparently in condition to fire.

(j) On the forecastle-deck, and on the poop-deck were mounted the two 4-inch rifles. They were said to be very unreliable. My examination showed them to be badly eroded, sights antiquated, breech plugs loose on their hinges, much lost motion in both sight and training mechanisms, and, taken all in all, more dangerous to their own crew than the enemy. Many boxes of ammunition (both 6-pounder and 4-inch) were scattered all about the decks. I noted that blind shell, armor-piercing shell, and shrapnel were promiscuously mixed, shrapnel predominating. Was informed that *Tampico* had about 100 rounds of 4-inch for both guns and an unlimited supply of 6-pounder ammunition.

(k) Below decks I saw the plugged up shot-holes. They seemed to have been plugged with canvas, redlead and wooden plugs—sorry makeshifts. However, I was told that she was water-tight and all bilges were dry.

(l) The main engines were badly rusted, but could be used at slow speed. The generator was entirely out of commission, so they had no lights except kerosene lanterns. The ice-machine and many pumps were out of commission. The evaporator was said to be in fair condition. As there was no steam on the ship, I did not see any of this machinery working.

(m) Both boilers were dead, boiler fronts taken down and hand-hole plates taken off. She had two Babcock and Wilcox boilers. Salt crystals were hanging from the tubes, steam and fresh-water piping and water glasses. I was told that many of the tubes were leaking (about 500) and that they were being plugged with wooden plugs. Table legs were broken up for some of these plugs.

(n) The crew were a hard-looking lot of Mexicans; quite a few of them were wounded and badly scarred. Some of them wore hardly any clothes. The captain told me that he had but 38 men in his crew including 15 firemen, six seamen, and that the rest were *soldados*. He explained that he had no artificers and that the burned-out boiler was due to the carelessness and inexperience of the 15 shovelers. Had he had a few water-tenders and machinists he would have been able to reach Altata and be properly repaired.

12. Before leaving the ship, the captain said he intended to drift until he reached the shoal and then anchor, and that if the *Guerrero* hove in sight he would engage her even though at anchor, if he could reach her with his guns.

13. During the night of June 15, and morning of June 16, the three vessels drifted to the northwest until the shoal was reached, when the *Tampico* dropped both her anchors. Position, Lat. 25° 28′ 30″ North, Long. 109° 18′ West.

14. At daylight, Tuesday, June 16, I discovered two vessels to the northward bearing down on us very rapidly. These proved to be the *Guerrero* and the U. S. S. *New Orleans*. On sighting us, the *Guerrero* stopped and prepared for battle.

15. The *Guerrero* then advanced in a southwesterly direction until 7.47 a. m. (Mazatlan time) when the *Tampico* opened fire with her after 4-inch gun. Range estimated at 8000 yards.

16. At the time of opening fire, the vessels were situated as follows:

Tampico anchored in 22 fathoms in position Lat. 25° 28′ 30″ North, Long. 109° 18′ West.

Perry about two miles to southeast of *Tampico*.

Preble under way, about two miles southwest of *Tampico*.

Guerrero about four miles to northwest of *Tampico*, heading southwesterly.

New Orleans about two miles to northwest of *Guerrero*.

17. During the engagement, the *Guerrero* steamed alternately northeast and southwest (approximately), invariably turning to port at each turn. The *New Orleans* steamed around to westward of *Guerrero*, and assumed a position two or three miles southwest of *Tampico*. *Perry* stood to southwest. *Preble* steamed parallel courses to *Guerrero*, keeping at right angles to line of fire midway between the two ships, and about two miles clear of the line of fire. I made a series of rough notes during engagement, appended, inclosure (A).

18. *Tampico* fired first gun at 7.47 a. m., last gun at 9.45 a. m. *Guerrero* fired first gun at 7.48 a. m., last gun about 9.50 a. m. *Guerrero* fired 263 rounds in two hours and two minutes and made four hits, two of which did no material damage. *Tampico* fired 75 rounds in one hour and 58 minutes and made two hits, neither of which did any material damage.

19. When both vessels ceased firing, I headed full speed for *Tampico* and saw three live men on her forecastle waving white rags. These men refused to jump overboard and swim to *Preble*. The after end of *Tampico* was burning very fiercely, and shell and small-arm ammunition were exploding very rapidly. Several 4-inch shells were seen flying in all directions. *Preble* approached within 50 yards of *Tampico's* bow in order to rescue any drowning men. Finally forced to back away because of exploding ammunition. The *New Orleans* later lowered two boats and picked up seven men around *Tampico's* bow. *Preble* remained in vicinity until about 11.30 a. m., then anchored about 800 yards to southwest of *Tampico*.

20. At 1 p. m. Captain Irwin of the *New Orleans* called on commanding officer of *Guerrero* and I accompanied him aboard. Much of the information contained herein was received from commanding and executive officers of the *Guerrero*.

21. *Guns.*—*Guerrero* used her six 4-inch guns throughout, firing practically nothing but shrapnel. The *Tampico* used her two 4-inch guns, and her starboard 6-pounder, firing shrapnel, armor-piercing and cannon shell indiscriminately.

22. *Boats.*—The *Tampico* secured all her boats to her port boom—unengaged side. The *Guerrero* kept all her boats stowed on deck.

23. *Hits.*—The four hits and damage inflicted on *Tampico* are described elsewhere in this report. The *Guerrero* was hit twice, one shell cut a half-moon in her cut-water and caused no further damage. One shell struck her port bow, about 15 feet above water, passed entirely through the ship, piercing several light bulkheads, but did not explode.

24. *Killed and Injured.*—The *Guerrero's* crew escaped without a scratch. The *Tampico* is said to have 10 dead and 10 injured, with the remainder prisoners—seven of which are on *New Orleans*. The commanding officer (Malpica) committed suicide (fired revolver through his mouth) while in his boat alongside of *Guerrero*, as the prisoners were being taken aboard. The first assistant engineer (Estrada) was killed in action. The chief engineer (Johnson) escaped injury entirely and is now on board *Guerrero*. The executive (Rebatet) was picked up by the *Guerrero* while floating away on a plank. The executive of *Guerrero* said something about an injury to Rebatet's left leg, but I could not understand his description of the injury. Of the fate of the machinists nothing could be learned. The commanding officer of the *Guerrero* intimated that the prisoners would be kindly treated and eventually traded. Of the fate of the captured officers nothing was said, but I do not think they will be summarily executed.

25. *Method of Firing.*—The gun crews of *Tampico* were seen to load the guns, then lie down, while some one pulled the lanyard. I do not believe that the guns were sighted and kept on the target while firing. The same procedure was noted on board the *Guerrero* by one of the officers aboard this ship. The wild shooting can therefore be easily accounted for. The firing of the *Tampico* was generally better than that of the *Guerrero*.

26. During the engagement the *Tampico* burned waste, etc., in their furnaces in order to deceive the *Guerrero*. This ruse evidently succeeded in part because the *Guerrero* overlooked the fact that she could have steamed back and forth across the *Tampico's* stern, thus cutting the *Tampico's* fire to the one 4-inch gun mounted on her stern. At no time during all the firing could the range have been much less than 4000 yards, while the mean range was close to 6000 yards.

27. At 2.30 p. m. the *Preble* got under way and proceeded to La Paz, the *Perry* was directed to return to Mazatlan and the *New Orleans* was making ready to follow the *Guerrero* to Mazatlan.

(Signed) J. H. KLEIN, JR.

INCLOSURE (A)

ROUGH NOTES MADE DURING AND IMMEDIATELY AFTER THE ENGAGEMENT BETWEEN "TAMPICO" AND "GUERRERO" OFF TOPOLOBAMPO, MEXICO, ON TUESDAY, JUNE 16, 1914

7.47 a. m. *Tampico* opened fire—after 4-inch gun—shell fell 400 yards short.
7.48 " *Guerrero* opened fire—1000 yards over.
7.48½ " *Guerrero* fired two guns—one short and one over.
7.49 " *Guerrero* fired one gun—1000 yards over.
7.50 " Engagement general; estimated range 6000 yards.
7.51 " *Guerrero* changed course to starboard.
8.00 " Shell from both falling from 1000 yards short to 1000 yards over. Very poor firing, probably no attempt at spotting.

8.02 a. m. *Guerrero* stopped, presenting starboard side to *Tampico;* estimated range 6000 yards.
8.11 " Marksmanship of both sides getting worse instead of better. Some shells (*Tampico*) falling half way to *Guerrero*. Probably due to defective, wet ammunition.
8.13 " Both vessels ceased firing. Reason for silence unknown.
8.16 " *Tampico* opens fire again.
8.20 " *Guerrero* came about, firing rapidly, presents port broadside, all shells falling short (for her).
8.22 " *Guerrero* easing toward *Tampico*.
8.24 " Apparently first hit. *Tampico* struck at level main-deck forward of mainmast.
8.34 " One of *Tampico's* boats adrift.
8.35 " Range estimated 4000 yards.
8.37 " *Guerrero* changes course to port, presenting starboard broadside.
8.40 " *Guerrero* again heads for *Tampico*.
8.48 " *Tampico* struck, shell carries away gaff on mainmast. *Tampico's* colors shot away.
8.50 " *Guerrero* heading away from *Tampico*. *Guerrero* firing at the rate of about two guns per minute. *Tampico* firing at rate of about one gun every two minutes.
8.52 " *Guerrero* came about, presents port side; range estimated 5000 yards.
9.02 " Two more boats of *Tampico* adrift.
9.07 " *Guerrero* heading for *Tampico*, firing heavy salvos. One salvo (3 guns) spotted 500 yards over, 1000 yards over and 2000 yards over. Firing erratic. Battle becoming joke.
9.14 " *Guerrero* still heading for *Tampico*, but very slowly.
9.17 " *Guerrero* turns to port.
9.18 " Sharpnel bursts short of *Tampico*. Damage inflicted between smokepipe and bridge along main-deck.
9.20 " Flames and smoke appear on *Tampico's* quarterdeck.
9.42 " Power launch and pulling-boat on *Tampico's* starboard side—evidently preparing to abandon ship.
9.45 " Fire breaks out on *Tampico's* quarterdeck. Smoke envelopes after gun. Rebels continue firing this gun and waving flag.
9.50 " *Tampico's* crew abandon her, having set her afire. *Guerrero* heading full speed for *Tampico* and ceasing fire.
9.55 " *Tampico's* crew in boats heading for beach. *Guerrero* in pursuit.
10.15 " *Preble* close aboard *Tampico*, three live men on forecastle waving white rags. *New Orleans* lowering boats and rescuing men who jumped overboard.
10.45 " *Guerrero* picks up *Tampico's* boats and captures crew. All ships half-mast colors.
10.50 " *Guerrero* sends boats to land men on *Tampico*.
11.00 " *Guerrero's* boats pick up last survivor (discovered later that it was Rebatet, the executive).

11.10 a. m. Main deck *Tampico* caves in. Seething caldron in after part of ship.

Following damage noted on *Tampico:*

(a) Starboard side forward bridge wrecked. Two corpses on port side under bridge.
(b) Main-deck covered with wreckage and splintered gear.
(c) Shrouds of mainmast hanging over stern.
(d) Foretopmast pierced, but topmast still standing.
(e) Gaff and colors shot away.
(f) Part of aerial carried away.

11.15 " *Tampico* listing to starboard, sinking gradually.

11.35 " Water up to main-deck.

11.57½ " Water flows in after part (burned out), ship reels to starboard, suddenly stern sank, bow inclined 45°, decks bursting from air-pressure, bow nearly vertical; suddenly all glides under, air bubbles, no suction, little floating wreckage. *Tampico* is no more.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

DISTANTIAGRAPH

By W. D. FARRIS

The instrument represented by the accompanying drawing is designed to determine the actual distance a ship must pass off a light or point. The elements in the determination of said distance are two bearings and the distance run between them.

The angle made by each bearing with the course and the distance run between them are determined first. The operator then sets the first angle on blade 5, and the second angle on blade 8.

The next step is to set the small arc on the square the same as blade 8. Now, slide 15, carrying blades 12 and 13, is moved out along blade 8 until the distance run on scale 12 coincides with the inner edge 6 of blade 5. The distance the ship will pass off the light or point in question will be registered on blade 13 in coincidence with edge 11 of blade 10.

The instrument is a mechanical device for Table 5B in Bowditch's Tables. It does away with the necessity to wait and watch for certain point bearings on the part of the Officer of the Deck, whose attention need not be distracted from his other duties. It makes unnecessary going below deck to secure point bearings during unfavorable weather. The only light necessary for its use at night is the binnacle light. The other factors in its favor are: (1) Its simplicity of construction (being made of metal, it will be waterproof); (2) the simplicity of its operation, already described.

There are additional uses for this instrument. It will determine: (1) The approximate distance a ship will pass off a lighthouse; (2) the initial range and deflection for gun-firing. For the determination of the approximate distance, a bearing is taken and the number of degrees off the bow is set on blade 5. Now, blade 8 and arc 17 are set at 90 degrees; slide 15 is run out until the visibility of the light from the bridge in miles on the scale on

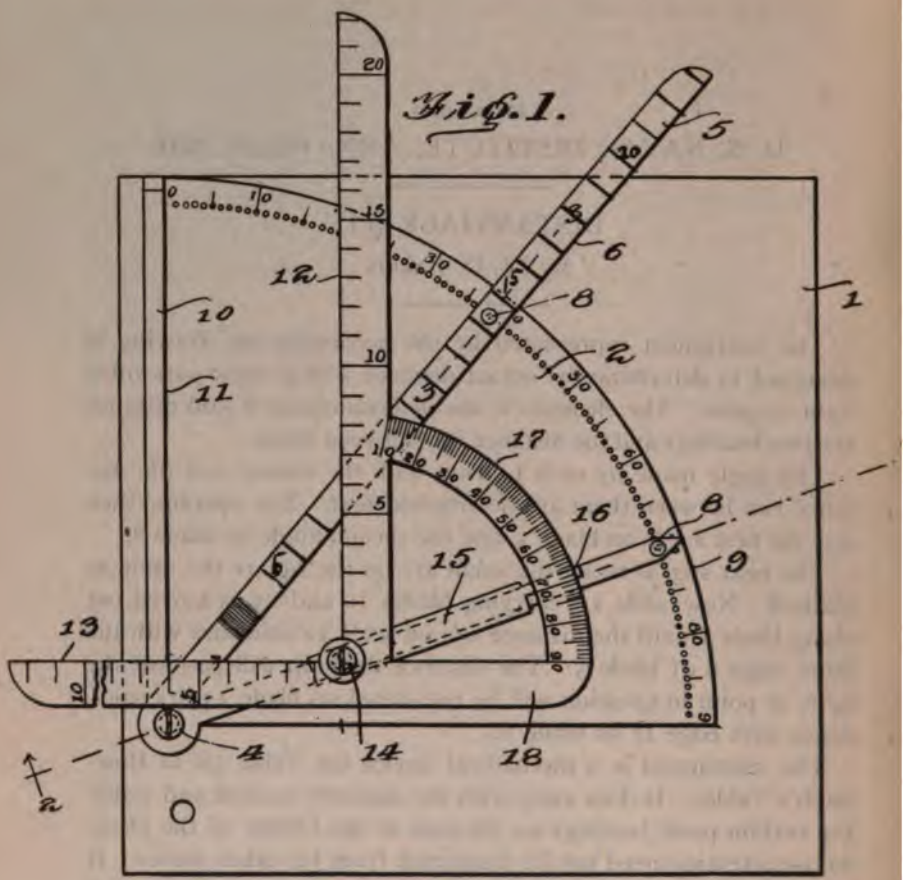

Fig. 1.

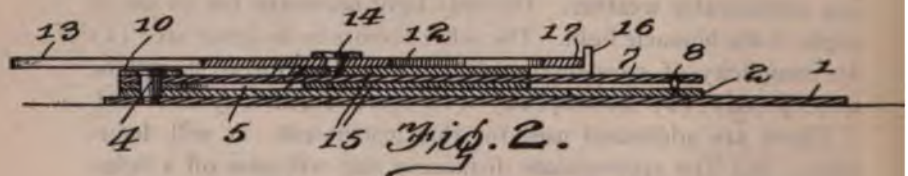

Fig. 2.

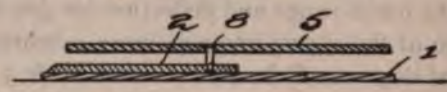

Fig. 3.

blade 5 coincides with the inner edge of blade 12. Blade 13 will then register the distance in question, if the course is maintained.

The calculation for finding the initial range and deflection for gun-firing involves three steps: (1) Gun correction, (2) wind correction, (3) target correction. It replaces the well-known rule of thumb. In the case of gun correction we must remember to use three-quarters of the ship's speed on the scale. Set blade 8 and arc 17 at 90 degrees; blade 5 is set at the number of degrees off the bow or stern the target bore; use the scale on blade 5 for the ship's speed, bringing blade 12 into coincidence with the speed indication. Then, blade 13 will give knots of deflection and blade 12 yards of range correction.

The same process is applied for wind correction. Now we use one-half of the Beaufort Scale of Wind on blade 5. The angle direction of the wind is set on blade 5. Blade 13 will indicate deflection in knots and blade 12 yards of range. For target correction use the speed of the target in knots on blade 5 and set the angle of its course with the line of fire on arc 9 with blade 5. Now bring blade 12 into coincidence with the speed of the target on blade 5; blade 13 will read the knots of deflection and blade 12 the yards of range.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

INSTRUCTION OF PETTY OFFICERS

By LIEUTENANT D. E. CUMMINGS, U. S. Navy

FOREWORD

This paper is submitted, not as a model, but rather as a suggestion as to what points need explanation. The general outline covered by this paper has been followed when appointments have been issued to petty officers; the general idea being to question the candidate to find out how completely he has the idea, and then to fill in the "holidays." The language used should be such as will be likely to impress the particular candidate, as should the example chosen. The more homely and everyday the examples chosen the more impressive they seem to be. A talk of this character, far from antagonizing a candidate, seems to be very well received, and a number have shown that they got the idea and profited by it. That being the case, there must be some value in it, and it is offered for what it is worth.

In rating petty officers it is only fair to them and to the ship and service that they be given a clear and definite idea of what their new office carries with it in the way of opportunity and of responsibility. This has been recognized in the Navy Regulations, which require that Article 3401 and the appointment be read by the candidate, and that the commanding officer deliver the appointment and sign as a witness, thus adding dignity and importance to the occasion and separating it in some degree from the single idea of an advance in pay.

When an appointment is issued to a petty officer he signs a statement thereon that he has read and *understands* the obligations imposed upon him by the appointment and by Article 3401, U. S. Navy Regulations, 1913. A little questioning, however, will usually show that the candidate's *understanding* of the meaning of that article, while perhaps correct, so far as it goes, usually falls far short of a complete understanding—and why shouldn't it? General Order No. 63 provides for a definite technical and pro-

fessional examination, but stops short of a full demonstration of what it means to be a *petty officer* as distinguished from a *rated man*. The "Bluejacket's Manual," 1915, contains a very valuable "little talk" to recruits on the subject of discipline and duty, but emphasizes obedience, punishments and a clear record chiefly. These phases of the question are of paramount interest to a recruit. A petty officer should be well indoctrinated in them and ready for a further development of his ideas of duty and discipline, a development along constructive lines, since he is now to assume definite responsibility in the upbuilding of the discipline and efficiency of the ship and of the service. Right here is where a few minutes' questioning by the division officer, the executive officer, or the commanding officer to determine how complete his understanding is, supplemented by such explanation as the answers show to be necessary, may prove of very great value to the candidate in enabling him more fully to meet the requirements of his office. Such an explanation would vary with the personality of the officer and of the candidate, and with the grasp of the subject indicated by the candidate's answers. It should always be remembered that it is the idea itself and not the technical definition that is important.

The candidate may be required to read aloud, paragraph by paragraph, Article 3401, explaining each paragraph in his own way as he goes along. Paragraph 1 reads as follows:

> Petty officers shall show in themselves a good example of subordination, courage, zeal, sobriety, neatness, and attention to duty.

Now, the principal idea of this paragraph is that a petty officer is an *example* to men of lower ratings. Every candidate knows that when he came into the service he got his ideas of how to get along by watching the people who had got along before him—the petty officers; and his own seagoing habits, whether good or bad, have been very largely the outgrowth of his contact with them. Obviously, then, it is important for him to think very seriously, now that he is himself to become a petty officer, of how he should conduct himself so that to-day's recruits may by his example be encouraged to become good service men.

This first paragraph goes on to state quite definitely along what lines that good example should be shown: First, subordination, which is a ready and unquestioning obedience to the letter and spirit of such orders as may be received from proper authority;

second, courage; third, zeal; fourth, sobriety; fifth, neatness; and sixth, attention to duty.

Paragraph 2 reads as follows:

They shall aid to the utmost of their ability in maintaining good order, discipline, and all that concerns the efficiency of the command.

The outstanding idea of this paragraph is that the petty officer has got out of the class of those who always wait to be told; he keeps an eye out on his own account for the things that should be done, and it becomes his duty to keep things moving. His aim should be that when a job is given him to do, or when a job naturally falls to him, his superior officers and petty officers need not think twice about that job because they know it will be done, and that, if any obstacle arises that seems insurmountable, it will be promptly reported to them and not neglected. It is not a crime to ask for assistance or advice, but to neglect a problem because one does not see the answer is unforgivable in a petty officer.

The meaning of the word discipline is a very important point to make clear. Discipline is variously defined: as education; as development of the faculties by instruction and exercise; as training, whether physical, mental or moral; as training to act in accordance with established rules; as accustoming to systematic and regular action; as drill; as subjection to rule; as submissiveness to order and control; as control; as a habit of obedience (Webster). All these definitions contain the idea of co-ordination by adherence to established rules; of instruction and exercise; of training and development; and underlying them all is the idea of authority.

Efficiency is defined by Webster as the "quality of . . . . getting an effect," or, in common parlance, efficiency means getting the answer. There are three qualities necessary to the efficient performance of a job. In some cases one of these qualities is the most important, in some cases another; but in all cases all three apply. The first quality is that the job, whether it be rendering honors, scrubbing decks, or sinking an enemy ship, shall be well and thoroughly done—going through the motions doesn't get much answer. The second quality is timeliness. For example it is far more important that a job be ready when it is needed than that it be performed economically. But the fact that the requirements that a job must be well done and done in time stand first does not in any way lessen the importance of the third quality, which is that it must be done economically—at the least cost of

time, labor and material. If you use all hands on a job that could be done by one section, your next job lies idle when it might as well be under way; and then where is your efficiency? And, equally, if you try to do with a section a job that requires all hands, how can you expect to get the answer?

Discipline, efficiency, and team-work are very much alike. In all, the man must be competent to do his own job—whether it is playing shortstop or steering a life-boat. When the Red Sox have the field and the batter makes a hit, all the rest of the players do not look at the first baseman and see whose field the ball is headed for and then sit down on their bases and watch them make the play; instead of that, every man on the team gets into position to back up those making the play. The pitcher will perhaps back up first, ready to take care of an overthrow; shortstop and second get ready to catch their man at second if necessary; each man backs up the man making the play, so that they go ahead confidently, knowing that the rest of the team will do their part, and even if everything doesn't " break " right, not much will get through them. So in a well-disciplined ship there is a habit of co-operation, and everybody not only does his own job right, but does it in such a manner as to make the other man's job easier. The fireman doesn't track coal dust on a clean deck, and the deck hand doesn't sift loose dirt down the fireroom hatch. And, too, this co-operation is both upward and downward—good discipline means that a petty officer not only does his job so fully and well that his superior officers don't have to worry about it and keep after him; but also that he keeps a good eye to the work of the men under him so that they can work to the best advantage—foresees, perhaps, the need for a fresh supply of sharp scrapers and provides them in time; plans his work so that it can all be done in orderly fashion at the proper time; instructs his men how to work to the best advantage; and sets high standards so that they may learn to know a good job when they see it.

Another phase of discipline is that all hands should play the same game—follow the same rules. What is more ridiculous than a boat's crew trying to win a race with all hands pulling a different stroke? Yet it might happen that the members of that crew individually are good oarsmen, only trained under different methods—one pulls with his back and another with his arms, one makes a quick finish to his stroke and another pulls evenly throughout. It is perfectly plain that they are bound to interfere with one

another and fail to keep stroke. It may well happen that there are several strokes that are perfectly good. Obviously, one has to be chosen; and any good stroke energetically followed is better than shifting constantly from one stroke to another, however excellent the various strokes may be. Until the crew all work together to accept *one* stroke—not all of them will consider it the best, perhaps—and train until they can follow it, they have neither discipline nor efficiency nor team-work. So that discipline involves a recognition of whose business it is to decide what to do and how to do it, and a cheerful acceptance of his decision.

Team-work, co-operation, doing your own job well, making the other fellow's job easier, playing the same game, according to the rules, acceptance of authority—these are the materials of which discipline is made; and the Regulations and Orders are the rules of the game.

Paragraph 3 reads thus:

> They are always on duty, even while on liberty, as far as breaches of discipline are concerned, and they shall endeavor to preserve order at all times. In case men are disorderly on shore, petty officers must arrest them and return them to their ships.

It is obviously desirable to keep men out of trouble, rather than to get them into it, and therefore to prevent disorder rather than to quell it after it happens; and this is often done by the patrol when they send men who are beginning to show too much exhilaration off to their ships before they get into trouble.

The more petty officers there are who perform their duty in this respect the less disorder and consequent trouble there will be for men ashore, and the better will be the reputation of the naval uniform—which is made chiefly by those men whose actions are most unpleasantly conspicuous. Remember that the disorderly man on shore wears the naval uniform just as does the officer of the deck, just as does the captain, just as does the admiral, and just as do you, the petty officer about to receive your appointment. In requiring order on the part of men ashore, then, you are not only carrying out your bounden duty, but you are protecting the reputation of your own uniform in the service. Do not let irresponsible men be disorderly, if not for their sake, then for your own.

To sum up, you, as a petty officer, are assuming a new responsibility, and to be an adequate example to men of inferior ratings, to be subordinate, attentive, and to promote good order, dis-

cipline, and all that affects the efficiency of the command, you must exert every effort to realize and grow up to your responsibilities; and keep in mind that because other men may let down the standards is no reason for your doing so—the more you hold up the standards the better for you personally, and the more petty officers there are who do the same, the better it will be for the service.

GENERAL.—In putting into practice the above principles, one or two pitfalls may be avoided if their nature is understood. It will often happen that the prescribed method of doing things may not seem as good as some other way that you know about; or some restriction in regard to liberty or to hours or methods of work may not strike you as being just fair. There are two ways to act in such a case. One is to sulk, or to growl, or to criticize, to to "knock"; to go about it in a half-hearted way, and to let your discontent be evident to those under you. The result of this course is to make your own job harder, because your discontent rapidly spreads to those under you and you will find it doubly hard to get work out of them. It also undermines the dicipline of the ship and makes trouble, not only for yourself but also for those men who are encouraged by your remarks or actions to do things that will get them into trouble. The other way is to assume that whoever has given the order has given it in good faith, and had good grounds for it, some of which you may not know; that, even if the method isn't perfect it can be made to work if you do your part; and to keep your doubts carefully hidden away in your own mind, and go ahead and carry out your orders. Sometimes it is permissible to state your doubts at a proper time and place to whoever gives the order; but never to the man that is to do the work—you at once double your own job. The result of this second way is that the job gets done with less friction, your men are more content, your job is lightened, and your reputation and efficiency are raised in the eyes both of those over you and of those under you. Be a "booster," not a "knocker."

It is hard for a petty officer to be unduly intimate with his subordinates and still maintain proper discipline. When you become a petty officer keep your eyes to the front—not to the rear. If you were not a better man than those under you you wouldn't be a petty officer—that's why you are rated, because you are a better man than some others. You may not have been any better originally, but now you are entitled to the respect of the men under you, and you can't get it by smoking their "butts."

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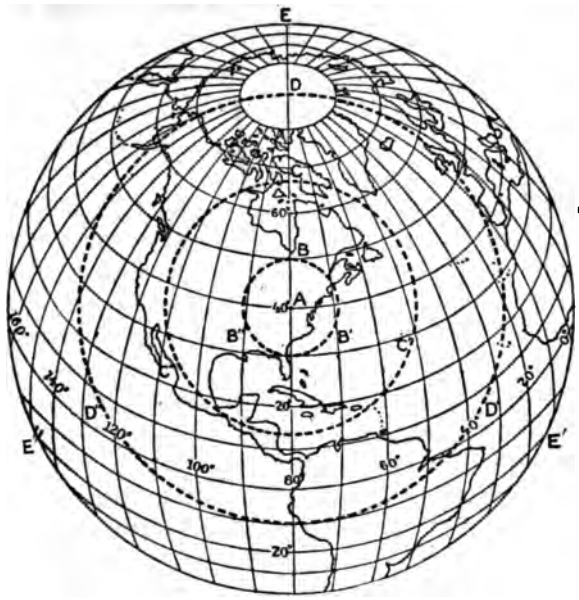
U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE CHART AS A MEANS OF FINDING GEOGRAPHICAL POSITION BY OBSERVATIONS OF CELESTIAL BODIES IN AERIAL AND MARINE NAVIGATION

By G. W. LITTLEHALES

The subject may be introduced by quoting the article of the American Practical Navigator, entitled "Circles of Equal Altitude," in which the accompanying figure is described:

In the figure, if $EE'E''$ represent the earth projected upon the horizon of a point A, and if it be assumed that, at some particular instant of time, a celestial body is in the zenith of that point, then the true altitude of the body



as observed at A will be 90°. In such a case the great circle $EE'E''$, which forms the horizon of A, will divide the earth into two hemispheres, and from any point on the surface of one of these hemispheres the body will

be visible, while over the whole of the other hemisphere it will be invisible. The great circle *EE'E"*, from the fact of its marking the limit of illumination of the body, is termed the *circle of illumination*, and from any point on its circumference the true altitude of the center of the body will be zero. If, now, we consider any small circle of the sphere, *BB'B"*, *CC'C"*, *DD'D"*, whose plane is parallel to the plane of the circle of illumination and which lies within the hemisphere throughout which the body is visible, it will be apparent that the true altitude of the body at any point of the circumference of one of these circles is equal to its true altitude at any other point of the same circumference; thus the altitude of the body at *B* is equal to its altitude at *B'* or *B"*, and its altitude at *D* is the same as at *D'* or *D"*.

It therefore follows that at any instant of time there is a series of positions on the earth at which a celestial body appears at the same given altitude, and these positions lie in the circumference of a circle described upon the earth's surface whose center is at that position which has the body in the zenith, and whose radius depends upon the zenith distance, or—what is the same thing—upon the altitude. Such circles are termed "circles of equal altitude." It is important to note that an observer making an instantaneous transit through the latitudes and longitudes passed over by any rhumb-line or loxodromic curve drawn within the hemisphere of illumination, through the point *A*, will experience no astronomical difference, with reference to the observed body in the zenith of *A*, save an altitude-difference.

If the instantaneous transit so described could coincide throughout some portion of its length with the arc of a great circle passing through the point *A*, then the extent of the transit throughout such coinciding portion would measure the altitude-difference between the limits of this coincidence, because the altitude-difference between any two circles of equal altitude is equal to the difference of their radii; that is to say, the distance from the circumference of one to that of the other along the arc of a great circle passing through the point *A*. A rhumb-line or loxodromic curve crosses all the successive meridians of longitude at the same angle of inclination, but a great circle arc crosses every successive meridian at a different angle; it is on this account that a rhumb-line cannot remain coincident with a great circle. This feature of divergence between the rhumb-line and the great circle is what limits the length of the intercept or altitude-difference that can be employed on a Mercator chart in laying down a Sumner line from an estimated or assumed geographical position in accordance with the method, first proposed by Saint-Hilaire, in which a comparison is made between the altitude of a celestial body as actually ***observed*** and that *calculated* from the estimated or assumed position of the

observer; for the intercept is drawn as a straight line, which is a rhumb-line on the Mercator chart, while the altitude-difference is in reality the arc of a great circle, which is a curved line on the Mercator chart except when coinciding with a meridian or with the equator. Hence it is only within an extent in which the divergence between the two is not of consequence that the straight line intercept on the Mercator chart may be looked upon as representing the true distance to the Sumner line and the true direction at right angles to which that line is to be drawn.

Before proceeding to inquire how this limitation may be removed, let us ascertain the amount of its effect in turning the Sumner line out of its true direction; for it is in this respect that the effect of the divergence between the rhumb-line and the great circle first manifests itself and gains its most rapid advance as a source of error in fixing position at sea by intersecting Sumner lines plotted on the Mercator chart. If a table were formed giving the change in azimuth for an altitude-difference of one minute of arc, corresponding to successive values of the altitude h' and the azimuth Z' in the expression $\frac{\Delta Z}{\Delta h} = -\tan h' \cot Z'$, it would appear from this tabulation that, in some circumstances, the direction of the Sumner line may be affected more than a degree for each minute of arc in the altitude-difference, and that, while the effect is in general much more moderate, especially when the observed celestial body bears more than 45° from the meridian and has not yet risen to 45° in altitude, yet in no circumstances could an altitude-difference of a length of several hundred minutes of latitude be employed without too greatly affecting the direction of the Sumner line.

As this limitation in the length of the intercept or altitude-difference that may be employed arises through the adoption of a straight line to represent an arc which is really a curved line on the Mercator chart, we are led at once to perceive that, if we construct a chart upon a system of projection having such qualities that angles are preserved nearly true and that the great circle is practically a straight line and that there is uniformity of scale within the required limits of tolerance, then we may employ intercepts of any length requisite to lay down a Sumner line anywhere within the limits of a chart from a single position chosen within its borders; and, if the simultaneous altitudes and azimuths of the

celestial bodies should be tabulated as they would appear at stated intervals of time in the chosen geographical position within the limits of the chart, an observer, in a position as yet unknown, having measured the altitude of a celestial body, could at once lay down his line of position by comparing the altitude so measured with the tabulated altitude of that body and laying off the difference between the measured and the tabulated altitude as an intercept from the chosen geographical position in the direction of the azimuth of the celestial body, as ascertained from the tabulation, and toward or away from the bearing of the body according as the measured altitude was higher or lower than the tabulated altitude. The extremity of the intercept thus laid off marks a point through which passes the Sumner line upon which the observer's position lies.

The polyconic projection, which has been extensively used in the production of charts and maps in America, possesses the qualities required for this purpose, and, accordingly, a chart of the United States constructed upon this projection has been selected as an illustrative specimen to show that geographical position is found by this method with that degree of promptness in reaching quick conclusions which is demanded in aerial navigation.

The tables[1] of simultaneous altitudes and azimuths represent these elements as they would be measured by an observer stationed in the middle of the chart, in latitude 39° and longitude 97°, at intervals of 4 minutes of hour angle from his meridian, and the tabulation embraces, besides the brighter stars, the range of the declination, both north and south of the equator, of the sun, the moon, and the planets. A large compass diagram has been centered at the middle position in latitude 39° and longitude 97°, since all the altitude-differences are laid off from there; and circumferences of equal distance from this point have also been supplied, in order that, with a given altitude-difference, the observer may at once proceed to find the point through which his line of position is to be drawn by passing out by the amount of the altitude-difference to the proper drawn or intermediate circumference along the

[1] In these tables, while the azimuth is stated in degrees and tenths of a degree, the altitudes are set down in degrees and minutes, since the minute of altitude corresponds closely with the geographical mile. Future experience is relied upon to dictate whether the altitude should be expressed in degrees and decimals of a degree instead of degrees and minutes.

radial indicated by the azimuth ascertained from the bordering tabulation.

The following example, whose solution is indicated by the intersection of the lines *AB* and *CD* on the chart, will afford a specific illustration of the procedure:

Example.—Being in flight between Leavenworth, Kans., and San Francisco, Cal., during the night of February 1, 1917, at $6^h\ 59^m\ 14^s$ by a watch regulated to sidereal time of the meridian of the central position of the chart (97° or $6^h\ 28^m$ West of Greenwich), observed simultaneous altitudes of α Tauri (Aldebaran), bearing westward, and α Leonis (Regulus), bearing eastward. By horizon-free sextant, true altitude of α Tauri, 55° 35′ and of α Leonis 35° 13′. Find the geographical position of the observer.

Solution.—	α Tauri (Aldebaran)	α Leonis (Regulus)
	h m s	h m s
Local sidereal time	6 59 14	6 59 14
Right ascension	4 31 12	10 04 00
Hour angle	2 28 02	3 4 46
With these hour angles entering the tabulation on the chart under the names of these stars	Az. N. 114°.5 W.	N. 110°.1 E.
	Alt. 50° 34′	41° 19′
Measured altitude	55° 35′	35° 13′
Altitude-difference	5° 01′ = 301′	6° 06′ = 366′
	in direction N. 114°.5 W. or S. 65°.5 W.	in direction (180° + 110°.1) = 290°.1 or N. 69°.9 W.

The position-lines resulting from these observations have been plotted on the chart by passing out to the distance circumference 301 (=5°−01′) along the radial N. 114°.5 W. and through the point thus arrived at, drawing the position-line *AB* at right angles to the radial; and, likewise, by passing out to the distance circumference 366 (=6°−06′) along the radial N. 69°.9′ W., and through the point thus arrived at, drawing the position-line *CD* at right angles to this radial. The intersection of these position lines fixes the geographical position approximately over the city of Denver, in latitude 39° 45′ N. and longitude 105° W.

To amplify the illustration, a second example is presented as follows:

Example.—An observer in aerial flight along the coast of the Gulf of Mexico, during the morning of October 14, 1917, measures the true altitude of the sun's center to be 40° 14′ at $9^h\ 06^m\ 06^s$ a. m. by a watch regulated to

mean time of the meridian 97° or $6^h\ 28^m$ West of Greenwich. From the Nautical Almanac, the equation of time and sun's declination at time of observation are ascertained to be:

$$\text{Eq. T.} = 13^m\ 54^s + \text{to m. t., Dec. } 8°\ 5'.4\ \text{S.}$$

Find the Sumner line upon which the observer is located, and, by noting the intersection of this line with the coast line, the observer's geographical position.

	h	m	s	
L. M. T.	= 9	06	06	
Eq. T.	=+	13	54	
L. A. T.	= 9	20	00	
H. A.	= 2	40		Dec. — 8° 5′.4

Entering the tabulation on the chart with these values of the H. A. and Dec.

Measured altitude

Az.	132°	.7
Alt.	30°	04′
Alt.	42°	16′
	12°	12′ = 732′ in direction N. 132°.7 E.

Passing out to the distance 732 along the radial N. 132°.7 E., and drawing a Sumner line at right angles to the radial, locates the aircraft on the coast a little to the eastward of Pensacola.

Under self-imposed restrictions adopted in consideration of the circumstances and limited equipment of the aerial navigator, we have arrived at the solution of these observations for geographic position without the defaults which arise from treating the great circle arc of altitude-difference as a rhumb-line, and the exactitude with which the result has been reached would, if the scale of the chart had not been reduced, be sufficient to meet the requirements of aerial navigation. The availability of charts of like design would also prove efficient in meeting the required greater exactitude of marine navigation, if, instead of drawing the line of position as a straight line, the actual curve of the "circle of equal altitudes" be employed. This has the curvature on the present chart of a parallel of latitude representing a latitude equal to the altitude of the celestial body observed to obtain the "circle of equal altitude."

In this manner the actual curves for which the straight lines *AB* and *CD* were substituted have been supplied by the side of them in order that a comparison may be made in the case in point, between the position indicated by the intersection of *AB* and *CD* and that obtained by the intersection of the arcs of the actual "circles of equal altitude."

And attention should, perhaps, be drawn to the fact that portions of the tables of simultaneous altitudes and azimuths applicable to the case of a particular flight may be taken out beforehand, although it has not been found inconvenient to consult the tables in actual flight. Of course, it will not be overlooked that these tables would, without modification, serve a like purpose in relation to a similar chart of any other part of the world traversed by the 39th degree parallel of latitude, either in the northern or southern hemisphere.[1]

[1] The chart may be pasted on the back of an old chart with the tables adjoining if desired.

NORTH DECLINATION.

Hour Angle.	0°		1°		2°		3°		4°		5°		6°	
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.
h. m.	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°
0 0	51 0.0	180.0	52 0.0	180.0	53 0.0	180.0	54 0.0	180.0	55 0.0	180.0	56 0.0	180.0	57 0.0	180.0
4	50 59.4	178.4	51 59.4	178.4	52 59.4	178.3	53 59.4	178.3	54 59.4	178.3	55 59.4	178.2	56 59.4	178.2
8	50 57.4	176.8	51 57.4	176.8	52 57.3	176.7	53 57.3	176.6	54 57.2	176.5	55 57.2	176.4	56 57.2	176.4
12	50 54.2	175.2	51 54.1	175.1	52 54.0	175.0	53 53.8	174.9	54 53.7	174.8	55 53.6	174.7	56 53.4	174.5
16	50 49.7	173.7	51 49.5	173.5	52 49.2	173.4	53 48.9	173.2	54 48.7	173.1	55 48.5	172.9	56 48.2	172 7
20	50 43.9	172.1	51 43.6	171.9	52 43.2	171.7	53 42.8	171.6	54 42.4	171.4	55 42.0	171.2	56 41.6	170.9
24	50 36.8	170.5	51 36.4	170.3	52 35.8	170.1	53 35.3	169.9	54 34.7	169.6	55 34.2	169.4	56 33.6	169.1
28	50 28.5	169.0	51 27.9	168.7	52 27.1	168.5	53 26.4	168.2	54 25.6	167.9	55 24.9	167.7	56 24.0	167.4
32	50 19.0	167.4	51 18.2	167.1	52 17.2	166.9	53 16.3	166.6	54 15.3	166.3	55 14.2	165.9	56 13.1	165.6
36	50 8.2	165.9	51 7.2	165.6	52 6.0	165.3	53 4.8	164.9	54 3.5	164.6	55 2.2	164.2	56 0.8	163.9
40	49 56.2	164.4	50 54.9	164.0	51 53.5	163.7	52 52.0	163.3	53 50.4	162.9	54 48.8	162.6	55 47.1	162.1
44	49 43.1	162.8	50 41.4	162.5	51 39.7	162.1	52 37.9	161.7	53 36.1	161.3	54 34.1	160.9	55 32.1	160.4
48	49 28.7	161.3	50 26.8	161.0	51 24.8	160.6	52 22.7	160.1	53 20.6	159.7	54 18.3	159.2	55 15.9	158.7
52	49 13.2	159.9	50 11.0	159.5	51 8.6	159.0	52 6.3	158.6	53 3.7	158.1	54 1.0	157.6	54 58.3	157.1
0 56	48 56.6	158.4	49 54.0	158.0	50 51.4	157.5	51 48.6	157.0	52 45.7	156.5	53 42.7	156.0	54 39.5	155.4
1 0	48 38.9	156.9	49 36.0	156.5	50 33.0	156.0	51 29.9	155.5	52 26.5	154.9	53 23.1	154.4	54 19.6	153.8
4	48 20.1	155.5	49 16.8	155.0	50 13.4	154.5	51 9.9	154.0	52 6.2	153.4	53 2.4	152.8	53 58.4	152.2
8	48 0.2	154.1	48 56.5	153.6	49 52.8	153.0	50 48.9	152.5	51 44.8	151.9	52 40.5	151.3	53 36.0	150.7
12	47 39.3	152.7	48 35.3	152.2	49 31.2	151.6	50 26.8	151.0	51 22.3	150.4	52 17.6	149.8	53 12.7	149.1
16	47 17.6	151.3	48 13.1	150.8	49 8.4	150.2	50 3.7	149.6	50 58.7	149.0	51 53.6	148.3	52 48.2	147.6
20	46 54.6	150.0	47 49.8	149.4	48 44.8	148.8	49 39.6	148.2	50 34.2	147.5	51 28.6	146.9	52 22.7	146.2
24	46 30.8	148.6	47 25.6	148.0	48 20.1	147.4	49 14.5	146.8	50 8.7	146.1	51 2.6	145.4	51 56.3	144.7
28	46 6.0	147.3	47 0.4	146.7	47 54.5	146.1	48 48.5	145.4	49 42.2	144.7	50 35.6	144.0	51 28.8	143.3
32	45 40.4	146.0	46 34.3	145.4	47 28.1	144.7	48 21.6	144.1	49 14.8	143.4	50 7 7	142.6	51 0.5	141.9
36	45 13.9	144.7	46 7.4	144.1	47 0.7	143.4	47 53.7	142.7	48 46.5	142.0	49 39.0	141.3	50 31.3	140.5
40	44 46.5	143.5	45 39.6	142.8	46 32.5	142.1	47 25.0	141.4	48 17.3	140.7	49 9.4	139.9	50 1 2	139.2
44	44 18.4	142.2	45 11.0	141.6	46 3.4	140.9	46 55.6	140.1	47 47.4	139.4	48 39.0	138.6	49 30.2	137.8
48	43 49.4	141.0	44 41.6	140.3	45 33.6	139.6	46 25.3	138.9	47 16.7	138.1	48 7.8	137.4	48 58.6	136.5
52	43 19.7	139.8	44 11.4	139.1	45 3.0	138.4	45 54.2	137.6	46 45.2	136.9	47 35.8	136.1	48 26.1	135.3
1 56	42 49.2	138.6	43 40.5	137.9	44 31.6	137.2	45 22.5	136.4	46 12.9	135.7	47 3.0	134.9	47 53.0	134.0
2 0	42 18.1	137.5	43 9.0	136.8	43 59.6	136.0	44 50.0	135.2	45 40.0	134.5	46 29.7	133.7	47 19.1	132.8
4	41 46.2	136.3	42 36.7	135.6	43 26.9	134.8	44 16.8	134.1	45 6.3	133.3	45 55.6	132.5	46 44.6	131.6
8	41 13.7	135.2	42 3.8	134.5	42 53.5	133.7	43 43.0	132.9	44 32.1	132.1	45 20.9	131.3	46 9.3	130.5
12	40 40.5	134 1	41 30.1	133.4	42 19.5	132.6	43 8.5	131.8	43 57.2	131.0	44 45.6	130.2	45 33.6	129.3
16	40 6.7	133.0	40 55.9	132.3	41 44.8	131.5	42 33.5	130.7	43 21.7	129.9	44 9.7	129.1	44 57.2	128.2
20	39 32.3	132.0	40 21.2	131.2	41 9.7	130.4	41 57.9	129.6	42 45.7	128.8	43 33.2	128.0	44 20.3	127.1
24	38 57.4	130.9	39 45.8	130.1	40 33.9	129.3	41 21.7	128.6	42 9.1	127.7	42 56.1	126.9	43 42.9	126.0
28	38 21.9	129.9	39 9.8	129.1	39 57.6	128.3	40 44.9	127.5	41 32.0	126.7	42 18.6	125.8	43 4.9	125.0
32	37 45.8	128.9	38 33.4	128.1	39 20.7	127.3	40 7.6	126.5	40 54.3	125.6	41 40.5	124.8	42 26.3	123.9
36	37 9.2	127.9	37 56.5	127.1	38 43.4	126.3	39 30.0	125.5	40 16.2	124.6	41 2.1	123.8	41 47.5	122.9
40	36 32.1	126.9	37 19.0	126.1	38 5.5	125.3	38 51.7	124.5	39 37.6	123.6	40 23.0	122.8	41 8.2	121.9
44	35 54.6	125.9	36 41.1	125.1	37 27.3	124.3	38 13.1	123.5	38 58.6	122.7	39 43.6	121.8	40 28.4	120 9
48	35 16.6	125.0	36 2.7	124.2	36 48.5	123.4	37 34.0	122.6	38 19.1	121.7	39 3.9	120.8	39 48.1	120.0
52	34 38.2	124.0	35 23.9	123.2	36 9.3	122.4	36 54.4	121.6	37 39.2	120.8	38 23.6	119.9	39 7.6	119.0
2 56	33 59.3	123.1	34 44.7	122.3	35 29.8	121.5	36 14.6	120.7	36 59.0	119.8	37 43.0	119.0	38 26.7	118.1
3 0	33 20.1	122.2	34 5.1	121.4	34 49.9	120.6	35 34.2	119.8	36 18.3	118.9	37 2.0	118.1	37 45.3	117 2
4	32 40.4	121.3	33 25.1	120.5	34 9.5	119.7	34 53.6	118.9	35 37.3	118.0	36 20.7	117.2	37 3.7	116.3
8	32 0.4	120.4	32 44.8	119.6	33 28.8	118.8	34 12.6	118.0	34 56.0	117.1	35 39.1	116.3	36 21.8	115 4
12	31 20.0	119.5	32 4.1	118.7	32 47.8	117.9	33 31.2	117.1	34 14.3	116.3	34 57.1	115.4	35 39.5	114 6
16	30 39.2	118.7	31 23.0	117.9	32 6.4	117.1	32 49.6	116.3	33 32.4	115.4	34 14.8	114.6	34 57.0	113.7
20	29 58.1	117.8	30 41.6	117.0	31 24.8	116.2	32 7.6	115.4	32 50.1	114.6	33 32.3	113.7	34 14.1	112.9
24	29 16.8	117.0	29 59.9	116.2	30 42.8	115.4	31 25.3	114.6	32 7.5	113.7	32 49.4	112.9	33 31.0	112.0
28	28 35.1	116.2	29 17.9	115.4	30 0.5	114.6	30 42.8	113.8	31 24.7	112.9	32 6.3	112.1	32 47.7	111.2
32	27 53.1	115.4	28 35.7	114.6	29 18.0	113.8	30 0.0	112.9	30 41.6	112.1	31 23.0	111.3	32 4.1	110.4
36	27 10.9	114.6	27 53.1	113.8	28 35.1	113.0	29 16.9	112.1	29 58.3	111.3	30 39.4	110.5	31 20.3	109.6
40	26 28.3	113.8	27 10.3	113.0	27 52.1	112.2	28 33.6	111.4	29 14.8	110.5	29 55.6	109.7	30 36.2	108.8
44	25 45.5	113.0	26 27.3	112.2	27 8.8	111.4	27 50.1	110.6	28 31.0	109.7	29 11.7	108.9	29 52.0	108.1
48	25 2.5	112.2	25 44.0	111.4	26 25.3	110.6	27 6.3	109.8	27 47.0	109.0	28 27.5	108.1	29 7.6	107.3
52	24 19.2	111.5	25 0.5	110.7	25 41.5	109.9	26 22.3	109.1	27 2.8	108.2	27 43.1	107.4	28 23.0	106.5
3 56	23 35.7	110.7	24 16.8	109.9	24 57.6	109.1	25 38.2	108.3	26 18.4	107.5	26 58.4	106.6	27 38.2	105.8
4 0	22 52.0	110.0	23 32.8	109.2	24 13.4	108.4	24 53.8	107.6	25 33.9	106.7	26 13.7	105.9	26 53.7	105.1
4	22 8.0	109.2	22 48.6	108.4	23 29.1	107.6	24 9.3	106.8	24 49.1	106.0	25 28.7	105.2	26 8.1	104.3
8	21 23.9	108.5	22 4.3	107.7	22 44.6	106.9	23 24.5	106.1	24 4.2	105.3	24 43.7	104.5	25 22.9	103.6
12	20 39.6	107.8	21 19.8	107.0	21 59.9	106.2	22 39.7	105.4	23 19.2	104.6	23 58.4	103.7	24 37.5	102.9
16	19 55.1	107.1	20 35.1	106.3	21 15.0	105.5	21 54.6	104.7	22 34.0	103.9	23 13.1	103.0	23 52.0	102.2
20	19 10.4	106.4	19 50.4	105.6	20 30.0	104.8	21 9.5	104.0	21 48.7	103.1	22 27.6	102.3	23 6.4	101.5
24	18 25.6	105.7	19 5.3	104.9	19 44.8	104.1	20 24.1	103.3	21 3.1	102.5	21 42.0	101.6	22 20.6	100.8
28	17 40.6	105.0	18 20.2	104.2	18 59.5	103.4	19 38.7	102.6	20 17.6	101.8	20 56.2	101.0	21 34.8	100.1
32	16 55.5	104.3	17 34.9	103.5	18 14.1	102.7	18 53.1	101.9	19 31.8	101.1	20 10.4	100.3	20 48.8	99.5
36	16 10.3	103.6	16 49.4	102.8	17 28.6	102.0	18 7.4	101.2	18 46.1	100.4	19 24.5	99.6	20 2.8	98.8
40	15 24.9	102.9	16 3.9	102.1	16 42.9	101.3	17 21.6	100.5	18 0.2	99.7	18 38.5	98.8	19 16.6	98.1
44	14 39.4	102.2	15 18.3	101.4	15 57.2	100.7	16 35.8	99.9	17 14.2	99.1	17 52.4	98.2	18 30.2	97.4
48	13 53.7	101.6	14 32.5	100.8	15 11.2	100.0	15 49.8	99.2	16 28.0	98.4	17 6.2	97.6	17 44.2	96.8
52	13 8.0	100.9	13 46.7	100.1	14 25.2	99.3	15 3.6	98.5	15 41.8	97.7	16 19.9	96.9	16 57.8	96.1
4 56	12 22.2	100.2	13 0.8	99.4	13 39.2	98.7	14 17.5	97.9	14 55.6	97.1	15 33.6	96.3	16 11.3	95.5
5 0	11 36.2	99.6	12 14.7	98.8	12 53.1	98.0	13 31.3	97.2	14 9.3	96.4	14 47.2	95.6	15 25.0	94.8
4	10 50.1	98.9	11 28.7	98.1	12 6.9	97.4	12 45.0	96.6	13 22.9	95.8	14 0.8	95.0	14 38.5	94.2
8	10 4.1	98.3	10 42.4	97.5	11 20.6	96.7	11 58.7	95.9	12 36.6	95.1	13 14.4	94.3	13 52.0	93.5
12	9 17.9	97.6	9 56.1	96.8	10 34.2	96.1	11 12.2	95.3	11 50.1	94.5	12 27.8	93.7	13 5.4	92.9
16	8 31.7	97.0	9 9.8	96.2	9 47.8	95.4	10 25.5	94.6	11 3.6	93.8	11 41.3	93.0	12 18.9	92.2
20	7 45.4	96.3	8 23.4	95.5	9 1.4	94.8	9 39.2	94.0	10 17.0	93.2	10 54.7	92.4	11 32.2	91.6
24	6 59.0	95.7	7 37.0	94.9	8 14.9	94.1	8 52.7	93.3	9 30.4	92.6	10 8.1	91.8	10 45.6	91.0
28	6 12.6	95.1	6 50.5	94.3	7 28.4	93.5	8 6.2	92.7	8 43.8	91.9	9 21.5	91.1	9 58.9	90.3
32	5 26.1	94.4	6 4.0	93.6	6 41.8	92.9	7 19.6	92.1	7 57.3	91.3	8 34.9	90.5	9 12.3	89.7
36	4 39.6	93.8	5 17.4	93.0	5 55.2	92.2	6 33.0	91.4	7 10.6	90.7	7 48.2	89.9	8 25.7	89.1
40	3 53.0	93.2	4 30.8	92.4	5 8.7	91.6	5 46.4	90.8	6 24.0	90.0	7 1.6	89.2	7 39.1	88.5
44	3 6.4	92.5	3 44.3	91.7	4 22.1	91.0	4 59.8	90.2	5 37.4	89.4	6 15.0	88.6	6 52.6	87.8
48	2 19.8	91.9	2 57.7	91.1	3 35.4	90.3	4 13.1	89.5	4 50.8	88.8	5 28.4	88.0	6 5.9	87.2
52	1 33.2	91.3	2 11.1	90.5	2 48.8	89.7	3 26.5	88.9	4 4.1	88.1	4 41.8	87.3	5 19.4	86.6
5 56	0 46.6	90.6	1 24.4	89.9	2 2.2	89.1	2 39.9	88.3	3 17.5	87.5	3 55.2	86.7	4 32.9	86.0
6 0	0 0.0	90.0	0 37.8	89.2	1 15.5	88.5	1 53.3	87.7	2 31.0	86.9	3 8.7	86.1	3 46.2	85.3

NORTH DECLINATION.

Hour Angle.	7°		8°		9°		10°		11°		12°	
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.
h. m.	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°
0 0	58 0.0	180.0	59 0.0	180.0	60 0.0	180.0	61 0.0	180.0	62 0.0	180.0	63 0.0	180.0
4	57 59.3	178.1	58 59.3	178.1	59 59.2	178.0	60 59.2	177.9	61 59.1	177.9	62 59.0	177.8
8	57 57.1	176.3	58 57.0	176.2	59 56.9	176.1	60 56.8	175.9	61 56.6	175.8	62 56.5	175.6
12	57 53.9	174.4	58 53.0	174.2	59 52.8	174.1	60 52.5	173.9	61 52.3	173.7	62 52.0	173.5
16	57 48.0	172.5	58 47.7	172.3	59 47.3	172.1	60 46.9	171.9	61 46.5	171.6	62 46.0	171.4
20	57 41.2	170.7	58 40.7	170.4	59 40.1	170.2	60 39.6	169.9	61 38.9	169.6	62 38.2	169.3
24	57 32.9	168.9	58 32.2	168.6	59 31.4	168.3	60 30.5	167.9	61 29.7	167.6	62 28.7	167.2
28	57 23.1	167.0	58 22.2	166.7	59 21.2	166.3	60 20.1	165.9	61 18.9	165.6	62 17.6	165.2
32	57 11.9	165.2	58 10.7	164.8	59 9.3	164.4	60 7.9	164.0	61 6.4	163.6	62 4.8	163.1
36	56 59.4	163.3	57 57.9	163.0	58 56.2	162.6	59 54.4	162.1	60 52.5	161.6	61 50.5	161.1
40	56 45.4	161.7	57 43.5	161.2	58 41.4	160.7	59 39.2	160.2	60 37.0	159.7	61 34.5	159.1
44	56 30.1	159.9	57 27.8	159.4	58 25.4	158.9	59 22.8	158.4	60 20.1	157.8	61 17.2	157.1
48	56 13.4	158.4	57 10.7	157.7	58 7.9	157.1	59 4.9	156.5	60 1.7	155.9	60 58.3	155.2
52	55 55.4	156.5	56 52.4	155.9	57 49.1	155.4	58 45.6	154.7	59 42.0	154.1	60 38.1	153.3
0 56	55 36.2	154.9	56 32.7	154.2	57 28.9	153.6	58 25.0	153.0	59 20.9	152.3	60 16.5	151.5
1 0	55 15.9	153.2	56 11.9	152.6	57 7.6	151.9	58 3.3	151.2	58 58.6	150.5	59 53.6	149.7
4	54 54.2	151.6	55 49.7	150.9	56 45.1	150.3	57 40.1	149.5	58 35.0	148.7	59 29.5	147.9
8	54 31.4	150.0	55 26.5	149.3	56 21.3	148.6	57 15.8	147.9	58 10.2	147.0	59 4.1	146.2
12	54 7.5	148.5	55 2.1	147.7	55 56.4	147.0	56 50.5	146.2	57 44.2	145.4	58 37.6	144.5
16	53 42.6	146.9	54 36.7	146.2	55 30.5	145.4	56 24.0	144.6	57 17.2	143.8	58 10.0	142.9
20	53 16.7	145.4	54 10.3	144.7	55 3.5	143.9	55 56.4	143.1	56 49.1	142.2	57 41.3	141.3
24	52 49.7	143.9	53 42.8	143.2	54 35.5	142.4	55 28.0	141.5	56 20.0	140.6	57 11.6	139.7
28	52 21.8	142.5	53 14.4	141.7	54 6.6	140.9	54 58.5	140.0	55 50.0	139.1	56 41.0	138.2
32	51 52.9	141.1	52 44.9	140.3	53 36.6	139.4	54 28.0	138.6	55 19.0	137.6	56 9.4	136.7
36	51 23.2	139.7	52 14.8	138.9	53 5.9	138.0	53 56.8	137.1	54 47.2	136.2	55 37.0	135.2
40	50 52.6	138.3	51 43.7	137.5	52 34.3	136.6	53 24.5	135.7	54 14.4	134.8	55 3.7	133.8
44	50 21.2	137.0	51 11.7	136.2	52 1.8	135.3	52 51.7	134.4	53 41.0	133.4	54 29.8	132.4
48	49 49.0	135.7	50 39.0	134.8	51 28.6	134.0	52 17.9	133.0	53 6.6	132.1	53 54.9	131.1
52	49 16.0	134.4	50 5.6	133.6	50 54.7	132.7	51 43.4	131.7	52 31.7	130.8	53 19.4	129.8
1 56	48 42.4	133.2	49 31.4	132.3	50 20.1	131.4	51 8.3	130.5	51 56.0	129.5	52 43.2	128.5
2 0	48 8.1	132.0	48 56.6	131.1	49 44.8	130.2	50 32.5	129.2	51 19.7	128.3	52 6.4	127.2
4	47 33.1	130.8	48 21.2	129.9	49 8.9	129.0	49 56.1	128.0	50 42.8	127.0	51 29.0	126.0
8	46 57.4	129.6	47 45.1	128.7	48 32.2	127.8	49 18.9	126.8	50 5.2	125.8	50 50.9	124.8
12	46 21.2	128.5	47 8.4	127.5	47 55.1	126.6	48 41.4	125.7	49 27.2	124.7	50 12.5	123.7
16	45 44.4	127.3	46 31.2	126.4	47 17.4	125.5	48 3.3	124.5	48 48.6	123.5	49 33.4	122.5
20	45 7.1	126.2	45 53.4	125.3	46 39.2	124.4	47 24.6	123.4	48 9.5	122.5	48 53.8	121.4
24	44 29.3	125.2	45 15.1	124.2	46 0.5	123.3	46 45.4	122.3	47 29.8	121.4	48 13.7	120.3
28	43 50.9	124.1	44 36.3	123.2	45 21.3	122.2	46 5.8	121.3	46 49.8	120.3	47 33.3	119.3
32	43 12.1	123.1	43 57.1	122.1	44 41.6	121.2	45 25.8	120.3	46 9.4	119.3	46 52.4	118.3
36	42 32.7	122.0	43 17.3	121.1	44 1.4	120.2	44 45.2	119.2	45 28.4	118.3	46 11.1	117.2
40	41 52.9	121.0	42 37.2	120.1	43 20.9	119.2	44 4.4	118.2	44 47.2	117.3	45 29.5	116.3
44	41 12.8	120.1	41 56.7	119.1	42 40.1	118.2	43 23.1	117.3	44 5.6	116.3	44 47.5	115.3
48	40 32.2	119.1	41 15.7	118.2	41 58.8	117.2	42 41.4	116.3	43 23.6	115.3	44 5.2	114.3
52	39 51.3	118.1	40 34.5	117.2	41 17.2	116.3	41 59.5	115.4	42 41.3	114.4	43 23.6	113.4
2 56	39 10.0	117.2	39 52.8	116.3	40 35.2	115.4	41 17.2	114.4	41 58.7	113.5	42 39.6	112.5
3 0	38 28.3	116.3	39 10.9	115.4	39 52.9	114.5	40 34.5	113.5	41 15.7	112.6	41 56.4	111.6
4	37 46.4	115.4	38 28.6	114.5	39 10.4	113.6	39 51.7	112.7	40 32.5	111.7	41 12.8	110.7
8	37 4.1	114.5	37 46.0	113.6	38 27.5	112.7	39 8.5	111.8	39 49.1	110.8	40 29.2	109.9
12	36 21.5	113.7	37 3.2	112.8	37 44.3	111.9	38 25.1	110.9	39 5.4	110.0	39 45.3	109.0
16	35 38.7	112.8	36 20.0	111.9	37 1.0	111.0	37 41.4	110.1	38 21.4	109.2	39 1.0	108.2
20	34 55.6	112.0	35 36.6	111.1	36 17.7	110.2	36 57.5	109.3	37 37.3	108.3	38 16.6	107.4
24	34 12.2	111.2	34 53.0	110.3	35 33.4	109.4	36 13.2	108.4	36 52.9	107.5	37 32.0	106.6
28	33 28.6	110.3	34 9.1	109.5	34 49.2	108.6	35 29.0	107.6	36 8.3	106.7	36 47.2	105.8
32	32 44.8	109.5	33 25.1	108.7	34 5.0	107.8	34 44.5	106.8	35 23.6	105.9	36 2.2	105.0
36	32 0.7	108.8	32 40.8	107.9	33 20.5	107.0	33 59.7	106.1	34 38.6	105.1	35 17.1	104.2
40	31 16.4	108.0	31 56.3	107.1	32 35.8	106.2	33 14.9	105.3	33 53.6	104.4	34 31.9	103.4
44	30 31.9	107.2	31 11.6	106.3	31 50.9	105.4	32 29.8	104.5	33 8.3	103.6	33 46.4	102.7
48	29 47.4	106.4	30 26.8	105.6	31 5.8	104.7	31 44.6	103.8	32 22.9	102.9	33 0.9	102.0
52	29 2.6	105.7	29 41.8	104.8	30 20.7	103.9	30 59.3	103.1	31 37.4	102.1	32 15.2	101.2
3 56	28 17.6	104.9	28 56.6	104.1	29 35.3	103.2	30 13.7	102.3	30 51.8	101.4	31 29.4	100.5
4 0	27 32.5	104.2	28 11.4	103.4	28 49.9	102.5	29 28.1	101.6	30 6.0	100.7	30 43.5	99.8
4	26 47.2	103.5	27 25.9	102.6	28 4.3	101.8	28 42.4	100.9	29 20.1	100.0	29 57.5	99.1
8	26 1.8	102.8	26 40.4	101.9	27 18.6	101.1	27 56.5	100.2	28 34.1	99.3	29 11.4	98.4
12	25 16.2	102.1	25 54.7	101.2	26 32.8	100.4	27 10.6	99.5	27 48.1	98.6	28 25.3	97.7
16	24 30.5	101.4	25 8.9	100.5	25 46.9	99.7	26 24.6	98.8	27 2.0	97.9	27 39.0	97.0
20	23 44.9	100.7	24 23.0	99.8	25 0.9	99.0	25 38.5	98.1	26 15.8	97.2	26 52.7	96.4
24	22 59.0	100.0	23 37.0	99.1	24 14.8	98.3	24 52.3	97.4	25 29.5	96.6	26 6.3	95.7
28	22 13.0	99.3	22 50.9	98.5	23 28.6	97.6	24 6.0	96.8	24 43.1	95.9	25 19.9	95.0
32	21 26.9	98.6	22 4.8	97.8	22 42.4	96.9	23 19.6	96.1	23 56.7	95.2	24 33.4	94.4
36	20 40.8	97.9	21 18.5	97.1	21 56.0	96.3	22 33.3	95.4	23 10.2	94.6	23 46.9	93.7
40	19 54.6	97.3	20 32.2	96.4	21 9.6	95.6	21 46.8	94.8	22 23.7	93.9	23 0.3	93.1
44	19 8.3	96.6	19 45.8	95.8	20 23.2	94.9	21 0.3	94.1	21 37.2	93.3	22 13.8	92.4
48	18 21.9	96.0	18 59.4	95.1	19 36.7	94.3	20 13.8	93.5	20 50.6	92.6	21 27.2	91.8
52	17 35.5	95.3	18 12.9	94.5	18 50.2	93.6	19 27.2	92.8	20 4.0	92.0	20 40.6	91.1
4 56	16 49.1	94.7	17 26.5	93.8	18 3.6	93.0	18 40.7	92.2	19 17.4	91.3	19 53.9	90.5
5 0	16 2.6	94.0	16 39.9	93.2	17 17.1	92.4	17 54.1	91.5	18 30.8	90.7	19 7.3	89.9
4	15 16.0	93.4	15 53.4	92.5	16 30.5	91.7	17 7.5	90.9	17 44.1	90.1	18 20.7	89.2
8	14 29.5	92.7	15 6.7	91.9	15 43.9	91.1	16 20.8	90.3	16 57.6	89.4	17 34.1	88.6
12	13 42.8	92.1	14 20.1	91.3	14 57.2	90.5	15 34.2	89.6	16 10.9	88.8	16 47.5	88.0
16	12 56.2	91.4	13 33.5	90.6	14 10.6	89.8	14 47.5	89.0	15 24.3	88.2	16 0.9	87.4
20	12 9.6	90.8	12 46.8	90.0	13 24.0	89.2	14 0.9	88.4	14 37.7	87.6	15 14.3	86.8
24	11 23.0	90.2	12 0.3	89.4	12 37.3	88.6	13 14.3	87.8	13 51.1	87.0	14 27.7	86.1
28	10 36.4	89.5	11 13.7	88.7	11 50.8	87.9	12 27.8	87.1	13 4.7	86.3	13 41.3	85.5
32	9 49.8	88.9	10 27.0	88.1	11 4.2	87.3	11 41.2	86.5	12 18.0	85.7	12 54.8	84.9
36	9 3.1	88.3	9 40.4	87.5	10 17.6	86.7	10 54.7	85.9	11 31.6	85.1	12 8.4	84.3
40	8 16.5	87.7	8 53.8	86.9	9 31.0	86.1	10 8.2	85.3	10 45.2	84.5	11 22.0	83.7
44	7 30.0	87.0	8 7.3	86.3	8 44.6	85.5	9 21.7	84.7	9 58.7	83.9	10 35.7	83.1
48	6 43.4	86.4	7 20.8	85.6	7 58.1	84.8	8 35.3	84.1	9 12.4	83.3	9 49.4	82.5
52	5 57.0	85.8	6 34.4	85.0	7 11.7	84.2	7 48.9	83.4	8 26.1	82.6	9 3.2	81.8
5 56	5 10.4	85.2	5 47.9	84.4	6 25.3	83.6	7 2.7	82.8	7 39.9	82.0	8 17.1	81.2
6 0	4 24.0	84.6	5 1.5	83.8	5 39.0	83.0	6 16.4	82.2	6 53.8	81.4	7 31.1	80.6

NORTH DECLINATION.

Hour Angle.	13°		14°		15°		16°		17°		18°	
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.
h. m.	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°
0 0	64 0.0	180.0	65 0.0	180.0	66 0.0	180.0	67 0.0	180.0	68 0.0	180.0	69 0.0	180.0
4	63 59.0	177.7	64 59.0	177.6	65 58.9	177.6	66 58.9	177.5	67 59.0	177.4	68 59.0	177.3
8	63 56.4	175.5	64 56.3	175.4	65 56.2	175.2	66 56.0	175.1	67 55.9	174.8	68 55.8	174.7
12	63 51.8	173.3	64 51.6	173.2	65 51.3	172.9	66 51.0	172.6	67 50.7	172.3	68 50.4	172.1
16	63 45.6	171.1	64 45.1	170.9	65 44.6	170.5	66 44.0	170.2	67 43.5	169.8	68 42.9	169.5
20	63 37.5	169.0	64 36.8	168.6	65 36.0	168.2	66 35.1	167.8	67 34.2	167.4	68 33.3	166.9
24	63 27.8	166.8	64 26.7	166.4	65 25.7	165.9	66 24.4	165.5	67 23.1	164.9	68 21.8	164.3
28	63 16.2	164.6	64 14.9	164.2	65 13.4	163.7	66 12.7	163.1	67 9.9	162.5	68 8.1	161.8
32	63 3.1	162.6	64 1.3	162.0	64 59.4	161.5	65 57.3	160.8	66 55.1	160.1	67 52.7	159.4
36	62 48.4	160.5	63 46.1	159.9	64 43.7	159.3	65 41.1	158.6	66 38.3	157.8	67 35.4	157.0
40	62 32.0	158.5	63 29.2	157.8	64 26.4	157.1	65 23.2	156.4	66 19.9	155.6	67 16.3	154.7
44	62 14.1	156.5	63 10.9	155.8	64 7.5	155.0	65 3.8	154.2	65 59.8	153.4	66 55.6	152.4
48	61 54.7	154.5	62 51.0	153.8	63 47.0	153.0	64 42.7	152.1	65 38.1	151.2	66 33.2	150.2
52	61 34.0	152.6	62 29.7	151.8	63 25.1	151.0	64 20.2	150.1	65 14.9	149.1	66 9.3	148.1
0 56	61 11.8	150.7	62 7.0	149.9	63 1.8	149.0	63 56.8	148.1	64 50.1	147.0	65 43.8	146.0
1 0	60 48.4	148.9	61 42.9	148.0	62 37.1	147.1	63 30.8	146.1	64 24.1	145.1	65 17.1	143.9
4	60 23.7	147.1	61 17.6	146.2	62 11.1	145.2	63 4.8	144.2	63 56.8	143.2	64 49.0	142.0
8	59 57.7	145.3	60 51.0	144.4	61 43.9	143.4	62 36.3	142.4	63 28.5	141.3	64 19.7	140.1
12	59 30.6	143.6	60 23.2	142.6	61 15.5	141.6	62 7.2	140.6	62 58.3	139.4	63 49.1	138.2
16	59 2.4	141.9	59 54.4	140.9	60 46.0	139.9	61 37.0	138.8	62 27.6	137.7	63 17.5	136.5
20	58 33.2	140.3	59 24.6	139.3	60 15.6	138.2	61 5.9	137.1	61 55.7	136.0	62 44.9	134.7
24	58 2.8	138.7	58 53.7	137.7	59 44.0	136.6	60 33.7	135.5	61 22.8	134.3	62 11.4	133.1
28	57 31.6	137.2	58 21.8	136.1	59 11.5	135.1	60 0.5	133.9	60 49.0	132.7	61 36.8	131.5
32	56 59.4	135.7	57 49.0	134.6	58 38.1	133.5	59 26.5	132.4	60 14.3	131.2	61 1.5	129.9
36	56 26.5	134.2	57 15.4	133.1	58 3.9	132.0	58 51.6	130.9	59 38.8	129.7	60 25.2	128.4
40	55 52.6	132.8	56 41.0	131.7	57 28.8	130.6	58 16.0	129.4	59 2.5	128.2	59 48.4	127.0
44	55 18.1	131.4	56 5.9	130.3	56 53.1	129.2	57 39.6	128.0	58 25.6	126.8	59 10.7	125.5
48	54 42.7	130.0	55 29.9	128.9	56 16.6	127.8	57 2.5	126.7	57 47.8	125.5	58 32.5	124.2
52	54 6.7	128.7	54 53.3	127.6	55 39.4	126.5	56 24.8	125.3	57 9.5	124.1	57 53.6	122.9
1 56	53 29.9	127.4	54 16.1	126.3	55 1.7	125.2	55 46.5	124.0	56 30.7	122.8	57 14.1	121.6
2 0	52 52.6	126.2	53 38.2	125.1	54 23.3	124.0	55 7.6	122.8	55 51.3	121.6	56 34.2	120.3
4	52 14.6	125.0	52 59.8	123.9	53 44.3	122.8	54 28.1	121.6	55 11.2	120.4	55 53.6	119.1
8	51 36.1	123.8	52 20.8	122.7	53 4.8	121.6	53 48.1	120.4	54 30.8	119.2	55 12.7	118.0
12	50 57.1	122.6	51 41.3	121.5	52 24.8	120.4	53 7.6	119.2	53 49.8	118.0	54 31.3	116.8
16	50 17.6	121.5	51 1.3	120.4	51 44.4	119.3	52 26.7	118.1	53 8.5	116.9	53 49.5	115.7
20	49 37.6	120.4	50 20.9	119.3	51 3.5	118.2	51 45.4	117.0	52 26.7	115.8	53 7.3	114.6
24	48 57.1	119.3	49 40.0	118.2	50 22.2	117.1	51 3.7	116.0	51 44.6	114.8	52 24.7	113.6
28	48 16.3	118.2	48 58.7	117.2	49 40.5	116.1	50 21.8	114.9	51 2.0	113.8	51 41.9	112.6
32	47 35.0	117.2	48 17.1	116.1	48 58.5	115.1	49 39.2	113.9	50 19.2	112.8	50 58.7	111.6
36	46 53.3	116.2	47 34.9	115.1	48 16.0	114.1	48 56.4	112.9	49 36.1	111.8	50 15.2	110.6
40	46 11.3	115.2	46 52.6	114.2	47 33.2	113.1	48 13.3	112.0	48 52.8	110.8	49 31.3	109.7
44	45 29.0	114.3	46 9.9	113.2	46 50.2	112.1	47 29.9	111.0	48 8.9	109.9	48 47.3	108.7
48	44 46.3	113.3	45 26.9	112.3	46 6.9	111.2	46 46.2	110.1	47 24.9	109.0	48 3.0	107.8
52	44 3.4	112.4	44 43.6	111.4	45 23.3	110.3	46 2.3	109.2	46 40.7	108.1	47 18.6	107.0
2 56	43 20.1	111.5	44 0.0	110.5	44 39.4	109.4	45 18.1	108.3	45 56.2	107.2	46 33.8	106.1
3 0	42 36.5	110.6	43 16.2	109.6	43 55.3	108.5	44 33.8	107.4	45 11.7	106.4	45 48.8	105.2
4	41 52.8	109.7	42 32.1	108.7	43 11.0	107.7	43 49.2	106.6	44 26.8	105.5	45 3.8	104.4
8	41 8.8	108.9	41 47.9	107.9	42 26.4	106.8	43 4.4	105.8	43 41.8	104.7	44 18.6	103.6
12	40 24.5	108.0	41 3.5	107.0	41 41.7	106.0	42 19.4	104.9	42 56.6	103.9	43 33.2	102.8
16	39 40.1	107.2	40 18.7	106.2	40 56.8	105.2	41 34.3	104.1	42 11.2	103.1	42 47.6	102.0
20	38 55.4	106.4	39 33.8	105.4	40 11.7	104.4	40 49.0	103.3	41 25.8	102.3	42 2.0	101.2
24	38 10.6	105.6	38 48.8	104.6	39 26.5	103.6	40 3.6	102.6	40 40.1	101.5	41 16.2	100.5
28	37 25.6	104.8	38 3.6	103.8	38 41.1	102.8	39 18.0	101.8	39 54.4	100.8	40 30.3	99.5
32	36 40.4	104.0	37 18.2	103.0	37 55.5	102.1	38 32.3	101.0	39 8.5	100.0	39 44.3	99.0
36	35 55.1	103.3	36 32.7	102.3	37 9.9	101.3	37 46.5	100.3	38 22.5	99.3	38 58.2	98.2
40	35 9.7	102.5	35 47.1	101.5	36 24.1	100.6	37 0.5	99.6	37 36.5	98.6	38 12.0	97.5
44	34 24.1	101.8	35 1.4	100.8	35 38.2	99.8	36 14.5	98.8	36 50.3	97.9	37 25.7	96.8
48	33 38.4	101.0	34 15.6	100.1	34 52.2	99.1	35 28.4	98.1	36 4.1	97.2	36 39.4	96.1
52	32 52.5	100.3	33 29.6	99.4	34 6.1	98.4	34 42.2	97.4	35 17.8	96.5	35 53.0	95.5
3 56	32 6.6	99.6	32 43.5	98.6	33 20.0	97.7	33 56.0	96.7	34 31.5	95.8	35 6.8	94.8
4 0	31 20.6	98.9	31 57.3	97.9	32 33.6	97.0	33 9.6	96.1	33 45.1	95.1	34 20.1	94.1
4	30 34.6	98.2	31 11.1	97.3	31 47.4	96.3	32 23.2	95.4	32 58.6	94.4	33 33.6	93.5
8	29 48.3	97.5	30 24.9	96.7	31 1.0	95.6	31 36.7	94.7	32 12.1	93.8	32 47.0	92.8
12	29 2.1	96.8	29 38.5	95.9	30 14.6	95.0	30 50.2	94.0	31 25.5	93.1	32 0.4	92.2
16	28 15.7	96.1	28 52.1	95.2	29 28.1	94.3	30 3.7	93.4	30 38.9	92.4	31 13.8	91.5
20	27 29.4	95.5	28 5.6	94.7	28 41.6	93.7	29 17.1	92.7	29 52.4	91.8	30 27.2	90.9
24	26 42.9	94.8	27 19.1	94.1	27 55.0	93.0	28 30.5	92.1	29 5.7	91.2	29 40.6	90.2
28	25 56.4	94.1	26 32.6	93.3	27 8.5	92.4	27 43.9	91.4	28 19.1	90.5	28 53.9	89.6
32	25 9.8	93.5	25 46.1	92.6	26 21.9	91.7	26 57.4	90.8	27 32.5	89.9	28 7.3	89.0
36	24 23.3	92.8	24 59.4	92.0	25 35.3	91.1	26 10.7	90.2	26 45.9	89.3	27 20.7	88.3
40	23 36.7	92.2	24 12.8	91.3	24 48.6	90.4	25 24.1	89.5	25 59.2	88.6	26 34.1	87.7
44	22 50.1	91.5	23 26.1	90.7	24 2.0	89.8	24 37.5	88.9	25 12.6	88.0	25 47.5	87.1
48	22 3.5	90.9	22 39.6	90.0	23 15.4	89.2	23 50.8	88.3	24 26.0	87.4	25 0.9	86.5
52	21 16.9	90.3	21 53.0	89.4	22 28.8	88.6	23 4.3	87.7	23 39.5	86.8	24 14.4	85.9
4 56	20 30.2	89.6	21 6.3	88.8	21 42.1	87.9	22 17.6	87.1	22 52.9	86.2	23 27.9	85.3
5 0	19 43.6	89.0	20 19.7	88.2	20 55.6	87.3	21 31.2	86.5	22 6.5	85.6	22 41.5	84.7
4	18 57.0	88.4	19 33.1	87.6	20 9.0	86.7	20 44.6	85.8	21 20.0	85.0	21 55.1	84.1
8	18 10.4	87.8	18 46.5	86.9	19 22.4	86.1	19 58.1	85.2	20 33.5	84.4	21 8.7	83.5
12	17 23.8	87.2	18 0.0	86.3	18 36.0	85.5	19 11.7	84.6	19 47.1	83.8	20 22.4	82.9
16	16 37.3	86.6	17 13.5	85.7	17 49.5	84.9	18 25.2	84.0	19 0.8	83.2	19 36.2	82.3
20	15 50.8	85.9	16 27.1	85.1	17 3.1	84.3	17 38.9	83.4	18 14.6	82.6	18 50.0	81.7
24	15 4.4	85.3	15 40.6	84.5	16 16.8	83.7	16 52.6	82.8	17 28.4	82.0	18 3.9	81.1
28	14 17.8	84.7	14 54.2	83.9	15 30.4	83.1	16 6.4	82.2	16 42.3	81.4	17 17.9	80.5
32	13 31.3	84.1	14 7.8	83.3	14 44.1	82.5	15 20.2	81.6	15 56.2	80.8	16 32.0	80.0
36	12 45.0	83.5	13 21.6	82.7	13 58.0	81.9	14 34.1	81.0	15 10.2	80.2	15 46.0	79.4
40	11 58.8	82.9	12 35.3	82.1	13 11.8	81.3	13 48.1	80.4	14 24.2	79.6	15 0.2	78.8
44	11 12.5	82.3	11 49.2	81.5	12 25.7	80.7	13 2.2	79.8	13 38.5	79.0	14 14.5	78.2
48	10 26.3	81.7	11 3.2	80.9	11 39.8	80.1	12 16.3	79.2	12 52.7	78.4	13 29.0	77.6
52	9 40.2	81.0	10 17.1	80.3	10 53.9	79.5	11 30.6	78.6	12 7.1	77.8	12 43.5	77.0
5 56	8 54.2	80.4	9 31.2	79.7	10 8.2	78.9	10 44.8	78.0	11 21.6	77.2	11 58.1	76.4
6 0	8 8.3	79.8	8 45.4	79.0	9 22.4	78.2	9 59.1	77.4	10 36.1	76.6	11 12.9	75.8

NORTH DECLINATION.

Hour Angle	19°		20°		21°		22°		23°		24°	
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.
h. m.	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°
0 0	70 0.0	180.0	71 0.0	180.0	72 0.0	180.0	73 0.0	180.0	74 0.0	180.0	75 0.0	180.0
4	69 59.0	177.2	70 59.0	177.1	71 58.9	177.0	72 58.8	176.8	73 58.7	176.6	74 58.6	176.4
8	69 55.7	174.4	70 55.5	174.2	71 55.3	174.0	72 55.0	173.6	73 54.7	173.3	74 54.3	172.9
12	69 50.1	171.7	70 49.7	171.4	71 49.2	171.0	72 48.6	170.5	73 48.0	170.0	74 47.2	169.5
16	69 42.3	169.0	70 41.5	168.6	71 40.7	168.1	72 39.7	167.4	73 38.6	166.8	74 37.3	166.1
20	69 32.3	166.4	70 31.1	165.8	71 29.8	165.2	72 28.4	164.4	73 26.7	163.6	74 24.9	162.8
24	69 20.3	163.7	70 18.7	163.0	71 16.7	162.3	72 14.7	161.4	73 12.4	160.6	74 9.8	159.6
28	69 6.1	161.2	70 3.9	160.4	71 1.4	159.5	71 58.7	158.6	72 55.7	157.6	73 52.3	156.4
32	68 50.2	158.6	69 47.3	157.8	70 44.1	156.8	71 40.7	155.8	72 36.8	154.6	73 32.5	153.3
36	68 32.2	156.2	69 28.6	155.2	70 24.7	154.2	71 20.4	153.1	72 15.7	151.8	73 10.4	150.4
40	68 12.5	153.7	69 8.3	152.7	70 3.5	151.6	70 58.4	150.4	71 52.8	149.1	72 46.5	147.6
44	67 51.0	151.4	68 45.9	150.3	69 40.4	149.2	70 34.4	147.9	71 27.9	146.5	72 20.5	144.9
48	67 27.9	149.1	68 22.0	148.0	69 15.7	146.8	70 8.8	145.4	71 1.4	144.0	71 52.9	142.4
52	67 3.3	146.9	67 56.6	145.8	68 49.4	144.5	69 41.5	143.1	70 33.0	141.6	71 23.5	139.9
0 56	66 37.1	144.7	67 29.5	143.6	68 21.4	142.2	69 12.8	140.8	70 3.4	139.2	70 52.9	137.6
1 0	66 9.5	142.7	67 1.2	141.5	67 52.3	140.1	68 42.6	138.6	69 32.2	137.0	70 20.7	135.3
4	65 40.7	140.8	66 32.6	139.4	67 21.7	138.1	68 11.2	136.6	68 59.8	134.9	69 47.3	133.2
8	65 10.5	138.8	66 0.6	137.5	66 49.9	136.1	67 38.5	134.6	68 26.3	132.9	69 12.8	131.2
12	64 39.3	137.0	65 28.5	135.6	66 17.0	134.2	67 4.7	132.6	67 51.4	131.0	68 37.2	129.3
16	64 6.9	135.2	64 55.4	133.8	65 43.1	132.4	66 30.0	130.8	67 16.0	129.2	68 0.7	127.4
20	63 33.5	133.4	64 21.2	132.1	65 8.1	130.6	65 54.2	129.0	66 39.5	127.4	67 23.2	125.7
24	62 59.3	131.8	63 46.2	130.4	64 32.3	128.9	65 17.6	127.4	66 1.9	125.7	66 45.6	124.0
28	62 24.0	130.2	63 10.2	128.8	63 55.5	127.3	64 40.0	125.7	65 23.6	124.1	66 5.8	122.4
32	61 48.0	128.6	62 33.5	127.2	63 18.1	125.7	64 1.9	124.2	64 44.7	122.5	65 26.2	120.8
36	61 11.1	127.1	61 55.9	125.7	62 39.8	124.2	63 22.9	122.7	64 4.9	121.1	64 45.7	119.4
40	60 33.6	125.6	61 17.8	124.2	62 1.0	122.8	62 43.4	121.2	63 24.8	119.6	64 4.9	118.0
44	59 55.3	124.2	60 38.8	122.8	61 21.4	121.4	62 3.2	119.9	62 43.9	118.3	63 23.4	116.6
48	59 16.4	122.9	59 59.4	121.5	60 41.4	120.0	61 22.5	118.5	62 2.6	117.0	62 41.5	115.3
52	58 36.9	121.5	59 19.3	120.2	60 0.7	118.7	60 41.3	117.2	61 20.9	115.7	61 59.3	114.1
1 56	57 56.9	120.3	58 38.7	118.9	59 19.5	117.5	59 59.6	116.0	60 38.6	114.5	61 16.4	112.9
2 0	57 16.4	119.0	57 57.7	117.7	58 38.0	116.3	59 17.5	114.8	59 56.0	113.3	60 33.2	111.7
4	56 35.4	117.8	57 16.1	116.5	57 55.9	115.1	58 34.9	113.6	59 12.9	112.1	59 49.8	110.6
8	55 54.0	116.7	56 34.3	115.3	57 13.6	114.0	57 52.1	112.5	58 29.5	111.0	59 5.9	109.5
12	55 12.1	115.5	55 51.9	114.2	56 30.8	112.9	57 8.7	111.4	57 45.8	110.0	58 21.8	108.5
16	54 29.8	114.4	55 9.2	113.1	55 47.7	111.8	56 25.2	110.4	57 1.9	108.9	57 37.5	107.4
20	53 47.2	113.4	54 26.1	112.1	55 4.2	110.8	55 41.3	109.4	56 17.7	107.9	56 52.8	106.5
24	53 4.2	112.3	53 42.8	111.1	54 20.4	109.7	54 57.3	108.4	55 33.2	107.0	56 8.0	105.5
28	52 20.9	111.3	52 59.1	110.1	53 36.4	108.8	54 12.9	107.4	54 48.5	106.0	55 23.0	104.6
32	51 37.4	110.3	52 15.1	109.1	52 52.1	107.8	53 28.3	106.5	54 3.6	105.1	54 37.9	103.7
36	50 53.5	109.4	51 31.0	108.1	52 7.6	106.9	52 43.5	105.6	53 18.5	104.2	53 52.4	102.8
40	50 9.4	108.4	50 46.5	107.2	51 22.9	106.0	51 58.5	104.7	52 33.2	103.3	53 6.9	101.9
44	49 25.0	107.5	50 1.9	106.3	50 38.0	105.1	51 13.3	103.8	51 47.7	102.5	52 21.2	101.1
48	48 40.4	106.6	49 17.1	105.4	49 52.8	104.2	50 27.9	102.9	51 2.1	101.6	51 35.4	100.3
52	47 55.7	105.8	48 32.1	104.6	49 7.6	103.4	49 42.4	102.1	50 16.4	100.8	50 49.4	99.5
2 56	47 10.7	104.9	47 46.8	103.7	48 22.1	102.5	48 56.7	101.3	49 30.5	100.0	50 3.4	98.7
3 0	46 25.5	104.1	47 1.4	102.9	47 36.5	101.7	48 10.9	100.5	48 44.5	99.2	49 17.2	98.0
4	45 40.2	103.3	46 15.9	102.1	46 50.8	100.9	47 25.0	99.7	47 58.4	98.5	48 31.0	97.2
8	44 54.7	102.5	45 30.2	101.3	46 4.9	100.1	46 39.0	98.9	47 12.3	97.7	47 44.7	96.5
12	44 9.2	101.7	44 44.5	100.5	45 19.0	99.4	45 52.9	98.2	46 26.0	97.0	46 58.3	95.8
16	43 23.4	100.9	43 58.4	99.8	44 32.9	98.6	45 6.6	97.5	45 39.6	96.3	46 11.9	95.1
20	42 37.6	100.1	43 12.5	99.0	43 46.8	97.9	44 20.4	96.7	44 53.4	95.6	45 25.4	94.4
24	41 51.7	99.4	42 26.5	98.3	43 0.6	97.2	43 34.0	96.0	44 6.9	94.9	44 38.9	93.7
28	41 5.5	98.7	41 40.3	97.6	42 14.3	96.5	42 47.7	95.3	43 20.4	94.2	43 52.4	93.0
32	40 19.5	97.9	40 54.0	96.8	41 27.9	95.8	42 1.2	94.6	42 33.9	93.5	43 5.8	92.3
36	39 33.2	97.2	40 7.6	96.1	40 41.4	95.1	41 14.7	94.0	41 47.3	92.8	42 19.2	91.7
40	38 47.0	96.5	39 21.3	95.4	39 55.0	94.4	40 28.2	93.3	41 0.8	92.2	41 32.6	91.1
44	38 0.6	95.8	38 34.8	94.8	39 8.5	93.7	39 41.6	92.6	40 14.1	91.5	40 46.0	90.4
48	37 14.1	95.1	37 48.4	94.1	38 22.0	93.0	38 55.1	92.0	39 27.5	90.9	39 59.4	89.8
52	36 27.6	94.4	37 1.8	93.4	37 35.4	92.4	38 8.4	91.3	38 40.9	90.3	39 12.8	89.2
3 56	35 41.2	93.8	36 15.3	92.8	36 48.8	91.7	37 21.9	90.7	37 54.3	89.6	38 26.1	88.5
4 0	34 54.6	93.1	35 28.7	92.1	36 2.2	91.1	36 35.1	90.0	37 7.7	89.0	37 39.5	87.9
4	34 8.1	92.5	34 42.1	91.5	35 15.6	90.5	35 48.6	89.4	36 21.1	88.4	36 52.9	87.4
8	33 21.4	91.8	33 55.5	90.8	34 28.9	89.8	35 1.9	88.8	35 34.4	87.8	36 6.3	86.7
12	32 34.8	91.2	33 8.9	90.2	33 42.3	89.2	34 15.3	88.2	34 47.8	87.2	35 19.8	86.1
16	31 48.2	90.5	32 22.2	89.6	32 55.7	88.6	33 28.7	87.6	34 1.3	86.6	34 33.3	85.5
20	31 1.6	89.9	31 35.6	88.9	32 9.1	88.0	32 42.2	87.0	33 14.8	86.0	33 46.8	85.0
24	30 15.0	89.3	30 49.0	88.3	31 22.5	87.3	31 55.6	86.4	32 28.3	85.4	33 0.4	84.4
28	29 28.3	88.7	30 2.3	87.7	30 35.9	86.7	31 9.1	85.8	31 41.8	84.8	32 14.0	83.8
32	28 41.7	88.0	29 15.7	87.1	29 49.3	86.1	30 22.6	85.2	30 55.4	84.2	31 27.7	83.2
36	27 55.2	87.4	28 29.2	86.5	29 2.9	85.5	29 36.2	84.6	30 9.0	83.6	30 41.4	82.7
40	27 8.6	86.8	27 42.7	85.9	28 16.4	84.9	28 49.7	84.0	29 22.5	83.0	29 55.3	82.1
44	26 22.2	86.2	26 56.2	85.3	27 30.0	84.4	28 3.4	83.4	28 36.4	82.5	29 9.0	81.5
48	25 35.5	85.6	26 9.8	84.7	26 43.6	83.8	27 17.1	82.8	27 50.2	81.9	28 23.0	81.0
52	24 49.0	85.0	25 23.3	84.1	25 57.2	83.2	26 30.9	82.3	27 4.1	81.3	27 37.0	80.4
4 56	24 2.6	84.4	24 37.0	83.5	25 11.0	82.6	25 44.7	81.7	26 18.1	80.8	26 51.0	79.8
5 0	23 16.3	83.8	23 50.7	82.9	24 24.8	82.0	24 58.6	81.1	25 32.1	80.2	26 5.2	79.3
4	22 29.9	83.2	23 4.4	82.3	23 38.6	81.4	24 12.6	80.5	24 46.1	79.6	25 19.4	78.7
8	21 43.6	82.6	22 18.2	81.8	22 52.6	80.9	23 26.6	80.0	24 0.3	79.1	24 33.7	78.2
12	20 57.4	82.0	21 32.1	81.2	22 6.6	80.3	22 40.8	79.4	23 14.6	78.5	23 48.2	77.6
16	20 11.3	81.5	20 46.1	80.6	21 20.7	79.7	21 54.9	78.8	22 28.9	77.9	23 2.6	77.0
20	19 25.2	80.9	20 0.2	80.0	20 34.9	79.1	21 9.3	78.3	21 43.4	77.4	22 17.2	76.5
24	18 39.2	80.3	19 14.3	79.4	19 49.1	78.6	20 23.6	77.7	20 58.0	76.8	21 32.0	75.9
28	17 53.3	79.7	18 28.5	78.9	19 3.4	78.0	19 38.1	77.1	20 12.6	76.3	20 46.8	75.4
32	17 7.4	79.1	17 42.8	78.3	18 17.8	77.4	18 52.7	76.6	19 27.4	75.7	20 1.7	74.8
36	16 21.7	78.5	16 57.2	77.7	17 32.4	76.9	18 7.5	76.0	18 42.3	75.1	19 16.8	74.3
40	15 36.1	78.0	16 11.7	77.1	16 47.0	76.3	17 22.3	75.4	17 57.2	74.6	18 32.0	73.7
44	14 50.5	77.4	15 26.3	76.5	16 1.8	75.7	16 37.2	74.9	17 12.4	74.0	17 47.3	73.2
48	14 5.0	76.8	14 41.0	76.0	15 16.7	75.1	15 52.3	74.3	16 27.6	73.4	17 2.8	72.6
52	13 19.8	76.2	13 55.8	75.4	14 31.7	74.5	15 7.4	73.7	15 43.0	72.9	16 18.3	72.0
5 56	12 34.5	75.6	13 10.7	74.8	13 46.7	74.0	14 22.7	73.1	14 58.4	72.3	15 34.0	71.5
6 0	11 49.4	75.0	12 25.8	74.2	13 2.1	73.4	13 38.2	72.6	14 14.1	71.8	14 49.8	70.9

SOUTH DECLINATION

Hour Angle.	0°		1°		2°		3°		4°		5°		6°	
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.
h. m.	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°
0 0	51 0.0	180.0	50 0.0	180.0	49 0.0	180.0	48 0.0	180.0	47 0.0	180.0	46 0.0	180.0	45 0.0	180.0
4	50 59.4	178.4	49 59.4	178.4	48 59.5	178.5	47 59.5	178.5	46 59.5	178.5	45 59.5	178.6	44 59.5	178.6
8	50 57.4	176.8	49 57.5	176.9	48 57.5	177.0	47 57.6	177.0	46 57.6	177.1	45 57.7	177.1	44 57.8	177.2
12	50 54.2	175.2	49 54.3	175.3	48 54.5	175.4	47 54.6	175.5	46 54.7	175.6	45 54.8	175.7	44 54.9	175.8
16	50 49.7	173.7	49 49.9	173.8	48 50.1	173.9	47 50.3	174.0	46 50.5	174.2	45 50.7	174.3	44 50.9	174.4
20	50 43.9	172.1	49 44.3	172.3	48 44.6	172.4	47 44.8	172.6	46 45.1	172.7	45 45.5	172.9	44 45.8	173.0
24	50 36.8	170.5	49 37.3	170.7	48 37.8	170.9	47 38.3	171.1	46 38.7	171.3	45 39.2	171.4	44 39.5	171.6
28	50 28.5	169.0	49 29.2	169.2	48 29.8	169.4	47 30.4	169.6	46 31.0	169.8	45 31.6	170.0	44 32.2	170.2
32	50 19.0	167.4	49 19.8	167.7	48 20.7	167.9	47 21.4	168.2	46 22.2	168.4	45 22.9	168.6	44 23.7	168.8
36	50 8.2	165.9	49 9.3	166.2	48 10.4	166.4	47 11.3	166.7	46 12.3	167.0	45 13.2	167.2	44 14.1	167.5
40	49 56.2	164.4	48 57.6	164.7	47 58.8	165.0	47 0.0	165.3	46 1.2	165.6	45 2.3	165.8	44 3.4	166.1
44	49 43.1	162.8	48 44.7	163.2	47 46.2	163.5	46 47.6	163.8	45 49.0	164.2	44 50.4	164.5	43 51.7	164.8
48	49 28.7	161.3	48 30.6	161.7	47 32.3	162.1	46 34.1	162.4	45 35.7	162.8	44 37.3	163.1	43 38.9	163.4
52	49 13.2	159.9	48 15.4	160.3	47 17.4	160.7	46 19.4	161.0	45 21.3	161.4	44 23.2	161.7	43 25.0	162.1
0 56	48 56.6	158.4	47 59.0	158.8	47 1.4	159.2	46 3.7	159.6	45 5.9	160.0	44 8.1	160.4	43 10.1	160.7
1 0	48 38.9	156.9	47 41.7	157.4	46 44.3	157.8	45 46.9	158.3	44 49.4	158.7	43 51.9	159.2	42 54.2	159.4
4	48 20.1	155.5	47 23.3	156.0	46 26.3	156.4	45 29.1	156.9	44 32.0	157.3	43 34.7	157.7	42 37.3	158.1
8	48 0.2	154.1	47 3.7	154.6	46 7.1	155.1	45 10.3	155.5	44 13.5	156.0	43 16.6	156.4	42 19.5	156.9
12	47 39.3	152.7	46 43.2	153.2	45 46.9	153.7	44 50.6	154.2	43 54.1	154.7	42 57.4	155.1	42 0.7	155.6
16	47 17.6	151.3	46 21.7	151.9	45 25.8	152.4	44 29.8	152.9	43 33.6	153.4	42 37.4	153.9	41 41.0	154.3
20	46 54.6	150.0	45 59.2	150.5	45 3.7	151.1	44 8.1	151.6	43 12.3	152.1	42 16.4	152.6	41 20.4	153.1
24	46 30.8	148.6	45 35.9	149.2	44 40.7	149.8	43 45.4	150.3	42 50.0	150.8	41 54.4	151.3	40 58.7	151.8
28	46 6.0	147.3	45 11.5	147.9	44 16.8	148.5	43 21.8	149.0	42 26.7	149.6	41 31.6	150.1	40 36.3	150.6
32	45 40.4	146.0	44 46.3	146.6	43 51.9	147.2	42 57.4	147.8	42 2.7	148.3	41 7.9	148.9	40 13.0	149.4
36	45 13.9	144.7	44 20.2	145.4	43 26.2	146.0	42 32.1	146.6	41 37.8	147.1	40 43.4	147.7	39 48.8	148.2
40	44 46.5	143.5	43 53.2	144.1	42 59.7	144.7	42 6.0	145.3	41 12.1	145.9	40 18.1	146.5	39 23.8	147.1
44	44 18.4	142.2	43 25.5	142.9	42 32.4	143.5	41 39.1	144.1	40 45.6	144.7	39 52.0	145.3	38 58.1	145.9
48	43 49.4	141.0	42 57.0	141.7	42 4.2	142.3	41 11.4	143.0	40 18.3	143.6	39 25.0	144.2	38 31.6	144.8
52	43 19.7	139.8	42 27.7	140.5	41 35.4	141.2	40 42.9	141.8	39 50.2	142.4	38 57.4	143.1	38 4.3	143.6
1 56	42 49.2	138.6	41 57.6	139.3	41 5.8	140.0	40 13.7	140.6	39 21.4	141.3	38 29.0	141.9	37 36.3	142.5
2 0	42 18.1	137.5	41 26.9	138.2	40 35.4	138.8	39 43.7	139.5	38 51.8	140.2	37 59.8	140.8	37 7.5	141.4
4	41 46.2	136.3	40 55.5	137.0	40 4.5	137.7	39 13.2	138.4	38 21.7	139.1	37 30.0	139.7	36 38.1	140.3
8	41 13.7	135.2	40 23.4	135.9	39 32.8	136.6	38 41.9	137.3	37 50.8	138.0	36 59.5	138.6	36 8.0	139.3
12	40 40.5	134.1	39 50.6	134.8	39 0.4	135.5	38 9.9	136.2	37 19.3	136.9	36 28.4	137.6	35 37.3	138.2
16	40 6.7	133.0	39 17.2	133.7	38 27.4	134.5	37 37.4	135.2	36 47.1	135.9	35 56.6	136.5	35 5.9	137.2
20	39 32.3	132.0	38 43.2	132.7	37 53.9	133.4	37 4.2	134.1	36 14.3	134.8	35 24.2	135.5	34 33.9	136.2
24	38 57.4	130.9	38 8.7	131.7	37 19.7	132.4	36 30.4	133.1	35 40.9	133.8	34 51.3	134.5	34 1.3	135.1
28	38 21.9	129.9	37 33.5	130.6	36 44.9	131.4	35 56.1	132.1	35 7.0	132.8	34 17.7	133.5	33 28.2	134.2
32	37 45.8	128.9	36 57.9	129.6	36 9.7	130.4	35 21.2	131.1	34 32.5	131.8	33 43.6	132.5	32 54.4	133.2
36	37 9.2	127.9	36 21.7	128.6	35 33.9	129.4	34 45.8	130.1	33 57.5	130.8	33 9.0	131.5	32 20.3	132.2
40	36 32.0	126.9	35 45.2	127.6	34 57.6	128.4	34 9.9	129.1	33 21.9	129.8	32 33.8	130.6	31 45.3	131.3
44	35 54.6	125.9	35 7.9	126.7	34 20.8	127.4	33 33.5	128.2	32 45.9	128.9	31 58.1	129.6	31 10.0	130.3
48	35 16.6	125.0	34 30.3	125.7	33 43.5	126.5	32 56.6	127.2	32 9.4	128.0	31 22.0	128.7	30 34.2	129.4
52	34 38.2	124.0	33 52.1	124.8	33 5.8	125.6	32 19.2	126.3	31 32.3	127.0	30 45.2	127.8	29 57.9	128.5
2 56	33 59.3	123.1	33 13.6	123.9	32 27.6	124.6	31 41.4	125.4	30 54.9	126.1	30 8.2	126.9	29 21.2	127.6
3 0	33 20.1	122.2	32 34.9	123.0	31 49.1	123.7	31 3.2	124.5	30 17.0	125.2	29 30.7	126.0	28 44.0	126.7
4	32 40.4	121.3	31 55.4	122.1	31 10.1	122.8	30 24.6	123.6	29 38.7	124.4	28 52.7	125.1	28 6.4	125.8
8	32 0.4	120.4	31 15.7	121.2	30 30.8	122.0	29 45.5	122.7	29 0.1	123.5	28 14.4	124.2	27 28.6	124.9
12	31 20.0	119.5	30 35.7	120.3	29 51.0	121.1	29 6.1	121.9	28 20.9	122.6	27 35.6	123.4	26 50.0	124.1
16	30 39.2	118.7	29 55.2	119.5	29 10.9	120.2	28 26.3	121.0	27 41.5	121.8	26 56.5	122.5	26 11.2	123.2
20	29 58.1	117.8	29 14.5	118.6	28 30.4	119.4	27 46.2	120.2	27 1.7	120.9	26 17.0	121.7	25 32.0	122.4
24	29 16.8	117.0	28 33.4	117.8	27 49.6	118.6	27 5.7	119.3	26 21.5	120.1	25 37.1	120.8	24 52.4	121.6
28	28 35.1	116.2	27 52.0	117.0	27 8.5	117.8	26 24.9	118.5	25 41.0	119.3	24 56.9	120.0	24 12.5	120.8
32	27 53.1	115.4	27 10.3	116.2	26 27.2	116.9	25 43.8	117.7	25 0.2	118.5	24 16.4	119.2	23 32.3	120.0
36	27 10.9	114.6	26 28.3	115.4	25 45.4	116.1	25 2.3	116.9	24 19.0	117.7	23 35.5	118.4	22 51.7	119.2
40	26 28.3	113.8	25 46.1	114.6	25 3.5	115.4	24 20.6	116.1	23 37.6	116.9	22 54.4	117.7	22 10.9	118.4
44	25 45.5	113.0	25 3.5	113.8	24 21.1	114.6	23 38.6	115.3	22 55.8	116.1	22 12.9	116.9	21 29.7	117.6
48	25 2.5	112.2	24 20.7	113.0	23 38.6	113.8	22 56.3	114.6	22 13.8	115.3	21 31.1	116.1	20 48.2	116.9
52	24 19.2	111.5	23 37.6	112.3	22 55.8	113.0	22 13.8	113.8	21 31.5	114.6	20 49.1	115.3	20 6.5	116.1
3 56	23 35.7	110.7	22 54.4	111.5	22 12.8	112.3	21 31.0	113.1	20 49.0	113.8	20 6.9	114.6	19 24.5	115.3
4 0	22 52.0	110.0	22 10.9	110.8	21 29.5	111.5	20 48.0	112.3	20 6.2	113.1	19 24.3	113.8	18 42.2	114.6
4	22 8.0	109.2	21 27.2	110.0	20 46.0	110.8	20 4.8	111.6	19 23.2	112.3	18 41.6	113.1	17 59.7	113.9
8	21 23.9	108.5	20 43.2	109.3	20 2.3	110.1	19 21.2	110.8	18 40.0	111.6	17 58.7	112.4	17 16.9	113.1
12	20 39.6	107.8	19 59.1	108.6	19 18.4	109.4	18 37.6	110.1	17 56.5	110.9	17 15.4	111.7	16 33.9	112.4
16	19 55.1	107.1	19 14.8	107.9	18 34.3	108.6	17 53.8	109.4	17 12.9	110.2	16 32.0	110.9	15 50.7	111.7
20	19 10.4	106.4	18 30.4	107.1	17 50.1	107.9	17 9.7	108.7	16 29.0	109.5	15 48.3	110.2	15 7.3	111.0
24	18 25.6	105.7	17 45.7	106.4	17 5.6	107.2	16 25.3	108.0	15 44.9	108.8	15 4.4	109.5	14 23.6	110.3
28	17 40.6	105.0	17 1.0	105.7	16 21.1	106.5	15 41.0	107.3	15 0.7	108.1	14 20.4	108.8	13 39.8	109.6
32	16 55.5	104.3	16 16.0	105.1	15 36.2	105.8	14 56.3	106.6	14 16.3	107.4	13 36.1	108.1	12 55.8	108.9
36	16 10.3	103.6	15 30.8	104.4	14 51.3	105.2	14 11.6	105.9	13 31.7	106.7	12 51.7	107.5	12 11.6	108.2
40	15 24.9	103.9	14 45.6	103.7	14 6.1	104.5	13 26.6	105.2	12 46.9	106.0	12 7.1	106.8	11 27.2	107.5
44	14 39.4	102.1	14 0.1	103.0	13 21.0	103.8	12 41.6	104.6	12 2.1	105.3	11 22.5	106.1	10 42.7	106.9
48	13 53.7	101.6	13 14.5	102.3	12 35.7	103.1	11 56.4	103.9	11 17.1	104.7	10 37.6	105.4	9 57.9	106.2
52	13 8.0	100.9	12 29.1	101.7	11 50.2	102.5	11 11.0	103.2	10 31.8	104.0	9 52.5	104.8	9 13.0	105.5
4 56	12 22.2	100.2	11 43.5	101.0	11 4.6	101.8	10 25.6	102.6	9 46.5	103.3	9 7.4	104.1	8 28.2	104.9
5 0	11 36.2	99.6	10 57.6	100.4	10 18.9	101.1	9 40.1	101.9	9 1.2	102.7	8 22.1	103.4	7 43.0	104.2
4	10 50.1	98.9	10 11.7	99.7	9 33.1	100.5	8 54.3	101.2	8 15.3	102.0	7 36.7	102.8	6 57.7	103.6
8	10 4.1	98.3	9 25.7	99.1	8 47.2	99.8	8 8.6	100.6	7 29.9	101.4	6 51.2	102.1	6 12.3	102.9
12	9 17.9	97.6	8 39.6	98.4	8 1.1	99.2	7 22.7	100.0	6 44.1	100.7	6 5.5	101.5	5 26.8	102.3
16	8 31.7	97.0	7 53.5	97.8	7 15.1	98.5	6 36.8	99.3	5 58.3	100.1	5 19.8	100.8	4 41.2	101.6
20	7 45.4	96.3	7 7.3	97.1	6 28.9	97.9	5 50.7	98.7	5 12.3	99.4	4 33.9	100.2	3 55.4	101.0
24	6 59.0	95.7	6 20.9	96.5	5 42.7	97.2	5 4.5	98.0	4 26.3	98.8	3 48.0	99.6	3 9.7	100.3
28	6 12.8	95.1	5 34.6	95.8	4 56.4	96.6	4 18.3	97.4	3 40.1	98.2	3 1.9	98.9	2 23.7	99.7
32	5 26.1	94.4	4 48.1	95.2	4 10.1	96.0	3 32.0	96.7	2 53.9	97.5	2 15.8	98.3	1 37.7	99.1
36	4 39.6	93.8	4 1.7	94.6	3 23.7	95.3	2 45.7	96.1	2 7.7	96.9	1 29.7	97.7	0 51.7	98.4
40	3 53.0	93.2	3 15.2	93.9	2 37.3	94.7	1 59.4	95.5	1 21.4	96.3	0 43.5	97.0	0 5.5	97.8
44	3 6.4	92.5	2 28.7	93.3	1 50.8	94.1	1 12.9	94.8	0 35.0	95.6				
48	2 19.8	91.9	1 42.1	92.7	1 4.3	92.5	0 26.4	94.2						
52	1 33.2	91.3	0 55.5	92.0	0 17.7	92.8								
5 56	0 46.6	90.6	0 8.9	91.4										
6 0	0 0.0	90.0												

SOUTH DECLINATION.

Hour Angle.	7°		8°		9°		10°		11°		12°	
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.
h. m.	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°
0 0	44 0.0	180.0	43 0.0	180.0	42 0.0	180.0	41 0.0	180.0	40 0.0	180.0	39 0.0	180.0
4	43 59.5	178.6	42 59.5	178.7	41 59.5	178.7	40 59.5	178.7	39 59.4	178.7	38 59.4	178.7
8	43 57.8	177.2	42 57.9	177.3	41 57.9	177.3	40 58.0	177.4	39 58.0	177.4	38 58.0	177.5
12	43 53.0	175.9	42 55.1	175.9	41 55.2	176.0	40 55.2	176.1	39 53.3	176.2	38 55.3	176.2
16	43 51.1	174.5	42 51.3	174.6	41 51.4	174.7	40 51.6	174.8	39 51.7	174.9	38 51.8	175.0
20	43 46.0	173.1	42 46.3	173.3	41 46.5	173.4	40 46.8	173.5	39 47.0	173.6	38 47.2	173.7
24	43 39.9	171.8	42 40.3	171.9	41 40.7	172.1	40 41.0	172.2	39 41.3	172.3	38 41.6	172.5
28	43 32.7	170.4	42 33.2	170.6	41 33.6	170.7	40 34.1	170.9	39 34.6	171.1	38 35.0	171.2
32	43 24.4	169.0	42 25.0	169.2	41 25.7	169.4	40 26.2	169.6	39 26.8	169.8	38 27.3	170.0
36	43 14.9	167.7	42 15.8	167.9	41 16.5	168.1	40 17.3	168.4	39 18.0	168.6	38 18.8	168.8
40	43 4.5	166.4	42 5.5	166.6	41 6.4	166.9	40 7.4	167.1	39 8.3	167.3	38 9.1	167.5
44	42 53.0	165.0	41 54.2	165.3	40 55.3	165.6	39 56.5	165.8	38 57.6	166.1	37 58.6	166.3
48	42 40.4	163.7	41 41.8	164.0	40 43.2	164.3	39 44.6	164.6	38 45.9	164.8	37 47.1	165.1
52	42 26.8	162.4	41 28.5	162.7	40 30.1	163.0	39 31.7	163.3	38 33.2	163.6	37 34.7	163.9
0 56	42 12.1	161.1	41 14.1	161.4	40 16.0	161.8	39 17.7	162.1	38 19.5	162.4	37 21.2	162.7
1 0	41 56.5	159.8	40 58.8	160.2	40 0.9	160.5	39 2.9	160.8	38 4.9	161.2	37 6.9	161.5
4	41 40.0	158.5	40 42.4	158.9	39 44.9	159.3	38 47.2	159.6	37 49.5	160.0	36 51.7	160.3
8	41 22.4	157.3	40 25.2	157.7	39 27.9	158.0	38 30.5	158.4	37 33.0	158.8	36 35.5	159.1
12	41 3.9	156.0	40 7.0	156.4	39 10.0	156.8	38 12.8	157.2	37 15.7	157.6	36 18.4	158.0
16	40 44.5	154.8	39 47.8	155.2	38 51.1	155.6	37 54.3	156.0	36 57.4	156.4	36 0.5	156.8
20	40 24.2	153.5	39 27.9	154.0	38 31.5	154.4	37 35.0	154.9	36 38.4	155.3	35 41.7	155.7
24	40 2.9	152.3	39 7.0	152.8	38 10.9	153.2	37 14.7	153.7	36 18.5	154.1	35 22.1	154.5
28	39 40.8	151.1	38 45.3	151.6	37 49.5	152.1	36 53.6	152.5	35 57.7	153.0	35 1.6	153.4
32	39 17.9	149.9	38 22.6	150.4	37 27.3	150.9	36 31.7	151.4	35 36.1	151.9	34 40.3	152.3
36	38 54.1	148.8	37 59.2	149.3	37 4.2	149.8	36 9.0	150.3	35 13.7	150.7	34 18.3	151.2
40	38 29.5	147.6	37 35.0	148.1	36 40.3	148.6	35 45.5	149.1	34 50.5	149.6	33 55.5	150.1
44	38 4.1	146.5	37 9.9	147.0	36 15.6	147.5	35 21.2	148.0	34 26.6	148.6	33 31.9	149.1
48	37 38.0	145.3	36 44.2	145.9	35 50.2	146.4	34 56.1	147.0	34 1.8	147.5	33 7.4	148.0
52	37 11.1	144.2	36 17.6	144.8	35 24.1	145.3	34 30.3	145.9	33 36.4	146.4	32 42.4	146.9
1 56	36 43.4	143.1	35 50.4	143.7	34 57.2	144.3	34 3.8	144.8	33 10.3	145.4	32 16.6	145.9
2 0	36 15.0	142.0	35 22.4	142.6	34 29.5	143.2	33 36.5	143.8	32 43.4	144.3	31 50.1	144.9
4	35 46.1	141.0	34 53.8	141.5	34 1.3	142.1	33 8.6	142.7	32 15.9	143.3	31 22.9	143.8
8	35 16.3	139.9	34 24.5	140.5	33 32.4	141.1	32 40.1	141.7	31 47.6	142.3	30 55.0	142.8
12	34 45.9	138.9	33 54.5	139.5	33 2.8	140.1	32 10.9	140.7	31 18.7	141.3	30 26.6	141.8
16	34 14.9	137.8	33 23.8	138.5	32 32.5	139.1	31 41.0	139.7	30 49.2	140.3	29 57.4	140.9
20	33 43.3	136.8	32 52.6	137.4	32 1.6	138.1	31 10.5	138.7	30 19.2	139.3	29 27.7	139.9
24	33 11.1	135.8	32 20.7	136.5	31 30.2	137.1	30 39.4	137.7	29 48.5	138.3	28 57.3	138.9
28	32 38.3	134.8	31 48.3	135.5	30 58.1	136.1	30 7.7	136.8	29 17.2	137.4	28 26.4	138.0
32	32 5.0	133.9	31 15.4	134.5	30 25.6	135.2	29 35.5	135.8	28 45.3	136.4	27 54.9	137.0
36	31 31.1	132.9	30 41.8	133.6	29 52.4	134.2	29 2.7	134.9	28 12.9	135.5	27 22.8	136.1
40	30 56.6	131.9	30 7.8	132.6	29 18.7	133.3	28 29.4	133.9	27 40.0	134.6	26 50.3	135.2
44	30 21.7	131.0	29 33.2	131.7	28 44.4	132.4	27 55.5	133.0	27 6.4	133.7	26 17.1	134.3
48	29 46.3	130.1	28 58.1	130.8	28 9.8	131.4	27 21.2	132.1	26 32.5	132.8	25 43.5	133.4
52	29 10.1	129.2	28 22.6	129.9	27 34.6	130.5	26 46.4	131.2	25 58.0	131.9	25 9.4	132.5
2 56	28 34.0	128.3	27 46.6	129.0	26 58.9	129.7	26 11.1	130.3	25 23.0	131.0	24 34.8	131.7
3 0	27 57.1	127.4	27 10.1	128.1	26 22.8	128.8	25 35.3	129.5	24 47.6	130.1	23 59.8	130.8
4	27 19.9	126.5	26 33.2	127.2	25 46.2	127.9	24 59.1	128.6	24 11.8	129.3	23 24.0	130.0
8	26 42.2	125.7	25 55.8	126.4	25 9.2	127.1	24 22.4	127.8	23 35.4	128.4	22 48.3	129.1
12	26 4.1	124.8	25 18.1	125.5	24 31.8	126.2	23 45.4	126.9	22 58.7	127.6	22 11.9	128.3
16	25 25.6	124.0	24 39.9	124.7	23 54.0	125.4	23 7.9	126.1	22 21.6	126.8	21 35.0	127.5
20	24 46.8	123.1	24 1.4	123.8	23 15.8	124.6	22 30.0	125.3	21 44.0	126.0	20 57.8	126.6
24	24 7.5	122.3	23 22.5	123.0	22 37.2	123.7	21 51.7	124.5	21 6.0	125.2	20 20.2	125.8
28	23 27.9	121.5	22 43.2	122.2	21 58.2	122.9	21 13.0	123.7	20 27.7	124.4	19 42.2	125.0
32	22 48.1	120.7	22 3.6	121.4	21 19.0	122.1	20 34.1	122.9	19 49.2	123.6	19 3.8	124.3
36	22 7.8	119.9	21 23.6	120.6	20 39.3	121.4	19 54.7	122.1	19 10.1	122.8	18 25.1	123.5
40	21 27.2	119.1	20 43.4	119.9	19 59.3	120.6	19 15.1	121.3	18 30.6	122.0	17 46.1	122.7
44	20 46.3	118.4	20 2.7	119.1	19 19.0	119.8	18 35.1	120.5	17 50.9	121.3	17 6.7	122.0
48	20 5.1	117.6	19 21.8	118.3	18 38.4	119.1	17 54.7	119.8	17 10.9	120.5	16 26.9	121.2
52	19 23.7	116.8	18 40.7	117.6	17 57.5	118.3	17 14.1	119.0	16 30.5	119.7	15 46.9	120.5
3 56	18 41.9	116.1	17 59.2	116.8	17 16.3	117.6	16 33.2	118.3	15 49.9	119.0	15 6.6	119.7
4 0	18 0.0	115.3	17 17.4	116.1	16 34.8	116.8	15 52.0	117.6	15 9.0	118.3	14 25.9	119.0
4	17 17.7	114.6	16 35.4	115.4	15 53.0	116.1	15 10.5	116.8	14 27.8	117.6	13 45.0	118.3
8	16 35.1	113.9	15 53.1	114.6	15 11.0	115.4	14 28.7	116.1	13 46.3	116.8	13 3.8	117.6
12	15 52.4	113.2	15 10.7	113.9	14 28.9	114.7	13 46.8	115.4	13 4.7	116.1	12 22.3	116.9
16	15 9.4	112.4	14 27.9	113.2	13 46.3	113.9	13 4.5	114.7	12 22.6	115.4	11 40.6	116.2
20	14 26.2	111.7	13 45.0	112.5	13 3.6	113.2	12 22.0	114.0	11 40.4	114.7	10 58.6	115.5
24	13 42.8	111.0	13 1.8	111.8	12 20.6	112.5	11 39.4	113.3	10 57.9	114.0	10 16.4	114.8
28	12 59.2	110.3	12 18.4	111.1	11 37.4	111.9	10 56.3	112.6	10 15.2	113.3	9 33.9	114.1
32	12 15.3	109.7	11 34.8	110.4	10 54.1	111.2	10 13.2	111.9	9 32.2	112.7	8 51.2	113.4
36	11 31.3	109.0	10 51.0	109.7	10 10.5	110.5	9 29.8	111.2	8 49.1	112.0	8 8.3	112.7
40	10 47.1	108.3	10 6.8	109.1	9 26.7	109.8	8 46.2	110.6	8 5.8	111.3	7 25.2	112.1
44	10 2.7	107.6	9 22.8	108.4	8 42.7	109.1	8 2.5	109.9	7 22.2	110.6	6 41.9	111.4
48	9 18.2	107.0	8 38.4	107.7	7 58.6	108.5	7 18.5	109.2	6 38.5	110.0	5 58.4	110.7
52	8 33.6	106.3	7 53.9	107.1	7 14.2	107.8	6 34.4	108.6	5 54.6	109.3	5 14.6	110.1
4 56	7 48.8	105.6	7 9.3	106.4	6 29.8	107.1	5 50.2	107.9	5 10.5	108.7	4 30.7	109.4
5 0	7 3.8	105.0	6 24.5	105.7	5 45.2	106.5	5 5.7	107.3	4 26.3	108.0	3 46.7	108.8
4	6 18.7	104.3	5 39.6	105.1	5 0.3	105.8	4 21.1	106.6	3 41.8	107.4	3 2.4	108.1
8	5 33.4	103.7	4 54.4	104.4	4 15.4	105.2	3 36.3	106.0	2 57.2	106.7	2 18.1	107.5
12	4 48.0	103.0	4 9.2	103.8	3 30.3	104.6	2 51.4	105.3	2 12.5	106.1	1 33.5	106.8
16	4 2.6	102.4	3 23.9	103.2	2 45.2	103.9	2 6.4	104.7	1 27.6	105.4	0 48.8	106.2
20	3 16.9	101.7	2 38.4	102.5	1 59.8	103.3	1 21.2	104.1	0 42.6	104.8	0 4.0	105.6
24	2 31.3	101.1	1 52.9	101.9	1 14.4	102.7	0 36.0	103.4				
28	1 45.5	100.5	1 7.2	101.3	0 28.9	102.0						
32	0 59.6	99.8	0 21.4	100.6								
36	0 13.6	99.2										
40												
44												
48												
52												
5 56												
6 0												

SOUTH DECLINATION.

Hour Angle.	13°		14°		15°		16°		17°		18°	
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.
h. m.	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°
0 0	38 0.0	180.0	37 0.0	180.0	36 0.0	180.0	35 0.0	180.0	34 0.0	180.0	33 0.0	180.0
4	37 59.4	178.8	36 59.5	178.8	35 59.5	178.8	34 59.5	178.8	33 59.5	178.8	32 59.6	178.9
8	37 58.0	177.5	36 58.1	177.6	35 58.1	177.6	34 58.1	177.7	33 58.2	177.7	32 58.2	177.7
12	37 55.4	176.3	36 55.5	176.4	35 55.6	176.4	34 55.7	176.5	33 55.8	176.5	32 55.9	176.6
16	37 51.9	175.1	36 52.1	175.1	35 52.2	175.2	34 52.3	175.3	33 52.5	175.4	32 52.7	175.5
20	37 47.4	173.8	36 47.6	173.9	35 47.8	174.0	34 48.0	174.1	33 48.2	174.2	32 48.5	174.3
24	37 41.9	172.6	36 42.3	172.7	35 42.6	172.9	34 42.9	173.0	33 43.2	173.1	32 43.5	173.2
28	37 35.5	171.4	36 35.9	171.5	35 36.2	171.7	34 36.6	171.8	33 37.0	172.0	32 37.5	172.1
32	37 27.9	170.2	36 28.5	170.3	35 29.0	170.5	34 29.5	170.7	33 30.1	170.8	32 30.6	171.0
36	37 19.5	169.0	36 20.2	169.1	35 20.9	169.3	34 21.5	169.5	33 22.2	169.7	32 22.8	169.9
40	37 10.0	167.8	36 10.9	168.0	35 11.7	168.2	34 12.5	168.4	33 13.4	168.6	32 14.2	168.7
44	36 59.7	166.6	36 0.7	166.8	35 1.7	167.0	34 2.7	167.2	33 3.6	167.4	32 4.6	167.6
48	36 48.3	165.4	35 49.6	165.6	34 50.8	165.8	33 51.9	166.1	32 53.1	166.3	32 54.2	166.5
52	36 36.1	164.2	35 37.5	164.4	34 38.9	164.7	33 40.3	164.9	32 41.6	165.2	32 42.9	165.4
0 56	36 22.8	163.0	35 24.5	163.3	34 26.1	163.5	33 27.7	163.8	32 29.2	164.1	31 30.7	164.3
1 0	36 8.8	161.8	35 10.6	162.1	34 12.4	162.4	33 14.2	162.7	32 16.0	163.0	31 17.7	163.3
4	35 53.9	160.6	34 55.9	161.0	33 57.9	161.3	32 59.9	161.6	32 1.9	161.9	31 3.9	162.2
8	35 37.9	159.5	34 40.3	159.8	33 42.6	160.2	32 44.8	160.5	31 47.0	160.8	30 49.2	161.1
12	35 21.1	158.3	34 23.8	158.7	33 26.3	159.0	32 28.8	159.4	31 31.3	159.7	30 33.7	160.1
16	35 3.5	157.2	34 6.4	157.6	33 9.2	157.9	32 12.0	158.3	31 14.8	158.6	30 17.4	159.0
20	34 45.0	156.1	33 48.1	156.5	32 51.3	156.8	31 54.3	157.2	30 57.4	157.6	30 0.3	157.9
24	34 25.7	155.0	33 29.1	155.4	32 32.5	155.8	31 35.9	156.1	30 39.2	156.5	29 42.4	156.9
28	34 5.8	153.9	33 9.5	154.3	32 13.1	154.7	31 16.6	155.1	30 20.2	155.5	29 23.7	155.9
32	33 44.5	152.8	32 48.6	153.2	31 52.7	153.6	30 56.6	154.0	30 0.5	154.4	29 4.3	154.8
36	33 22.8	151.7	32 27.2	152.1	31 31.6	152.6	30 35.8	153.0	29 40.0	153.4	28 44.0	153.8
40	33 0.3	150.6	32 5.1	151.1	31 9.7	151.5	30 14.2	152.0	29 18.7	152.4	28 23.1	152.8
44	32 37.1	149.5	31 42.2	150.0	30 47.1	150.5	29 52.0	150.9	28 56.8	151.4	28 1.5	151.8
48	32 13.0	148.5	31 18.4	149.0	30 23.7	149.4	29 28.9	149.9	28 34.0	150.4	27 39.0	150.8
52	31 48.3	147.4	30 54.1	147.9	29 59.7	148.4	29 5.2	148.9	28 10.6	149.4	27 16.0	149.9
1 56	31 22.8	146.4	30 28.9	146.9	29 34.9	147.4	28 40.8	147.9	27 46.5	148.4	26 52.2	148.9
2 0	30 56.7	145.4	30 3.1	145.9	29 9.5	146.4	28 15.7	146.9	27 21.9	147.4	26 27.9	147.9
4	30 29.9	144.4	29 36.7	144.9	28 43.3	145.4	27 49.9	146.0	26 56.4	146.5	26 2.7	147.0
8	30 2.4	143.4	29 9.5	143.9	28 16.6	144.5	27 23.5	145.0	26 30.3	145.5	25 37.0	146.0
12	29 34.2	142.4	28 41.7	143.0	27 49.1	143.5	26 56.4	144.0	26 3.6	144.6	25 10.8	145.1
16	29 5.3	141.4	28 13.3	142.0	27 21.1	142.6	26 28.7	143.1	25 36.2	143.6	24 43.6	144.2
20	28 36.1	140.5	27 44.3	141.1	26 52.4	141.6	26 0.4	142.2	25 8.2	142.7	24 16.0	143.3
24	28 6.1	139.5	27 14.7	140.1	26 23.1	140.7	25 31.5	141.2	24 39.7	141.8	23 47.8	142.4
28	27 35.5	138.6	26 44.5	139.2	25°53.3	139.8	25 2.0	140.3	24 10.6	140.9	23 19.1	141.5
32	27 4.4	137.7	26 13.7	138.3	25 22.8	138.8	24 31.9	139.4	23 40.9	140.0	22 49.7	140.6
36	26 32.7	136.7	25 42.4	137.3	24 52.0	137.9	24 1.4	138.5	23 10.7	139.1	22 19.8	139.7
40	26 0.5	135.8	25 10.5	136.4	24 20.4	137.0	23 30.2	137.6	22 39.8	138.2	21 49.3	138.8
44	25 27.7	134.9	24 38.1	135.6	23 48.3	136.2	22 58.5	136.8	22 8.5	137.4	21 18.4	138.0
48	24 54.3	134.1	24 5.2	134.7	23 15.8	135.3	22 26.3	135.9	21 36.7	136.5	20 46.9	137.1
52	24 20.7	133.2	23 31.8	133.8	22 42.7	134.4	21 53.6	135.1	21 4.3	135.7	20 14.9	136.3
2 56	23 46.5	132.3	22 57.9	132.9	22 9.2	133.6	21 20.4	134.2	20 31.5	134.8	19 42.4	135.4
3 0	23 11.7	131.5	22 23.5	132.1	21 35.2	132.7	20 46.8	133.4	19 58.2	134.0	19 9.5	134.6
4	22 36.5	130.6	21 48.7	131.3	21 0.7	131.9	20 12.6	132.5	19 24.4	133.2	18 36.0	133.8
8	22 0.9	129.8	21 13.4	130.4	20 25.9	131.1	19 38.1	131.7	18 50.2	132.4	18 2.1	133.0
12	21 24.9	128.9	20 37.7	129.6	19 50.4	130.3	19 3.0	130.9	18 15.5	131.6	17 27.8	132.2
16	20 48.4	128.1	20 1.6	128.8	19 14.7	129.5	18 27.6	130.1	17 40.4	130.8	16 53.0	131.4
20	20 11.6	127.3	19 25.1	128.0	18 38.5	128.7	17 51.7	129.3	17 4.9	130.0	16 17.9	130.6
24	19 34.2	126.5	18 48.1	127.2	18 1.8	127.9	17 15.4	128.5	16 28.9	129.2	15 42.2	129.8
28	18 56.6	125.7	18 10.8	126.4	17 24.8	127.1	16 38.8	127.8	15 52.6	128.4	15 6.2	129.1
32	18 18.5	124.9	17 33.1	125.6	16 47.5	126.3	16 1.7	127.0	15 15.9	127.7	14 29.9	128.3
36	17 40.1	124.2	16 55.0	124.9	16 9.7	125.6	15 24.3	126.2	14 38.7	126.9	13 53.0	127.6
40	17 1.4	123.4	16 16.6	124.1	15 31.6	124.8	14 46.5	125.5	14 1.3	126.2	13 15.9	126.8
44	16 22.3	122.7	15 37.8	123.4	14 53.1	124.1	14 8.3	124.7	13 23.4	125.4	12 38.4	126.1
48	15 42.9	121.9	14 58.7	122.6	14 14.4	123.3	13 29.9	124.0	12 45.3	124.7	12 0.6	125.4
52	15 3.1	121.2	14 19.2	121.9	13 35.1	122.6	12 51.0	123.3	12 6.8	124.0	11 22.4	124.7
3 56	14 23.1	120.4	13 39.5	121.1	12 55.7	121.8	12 11.9	122.5	11 28.0	123.2	10 43.9	123.9
4 0	13 42.8	119.7	12 59.6	120.4	12 15.9	121.1	11 32.3	121.8	10 48.7	122.5	10 5.0	123.2
4	13 2.1	119.0	12 19.0	119.7	11 35.9	120.4	10 52.6	121.1	10 9.3	121.8	9 25.9	122.5
8	12 21.1	118.3	11 38.4	119.0	10 55.5	119.7	10 12.6	120.4	9 29.6	121.1	8 46.4	121.8
12	11 39.9	117.6	10 57.4	118.3	10 14.9	119.0	9 32.2	119.7	8 49.5	120.4	8 6.6	121.1
16	10 58.5	116.9	10 16.3	117.6	9 34.0	118.3	8 51.6	119.0	8 9.1	119.8	7 26.6	120.5
20	10 16.6	116.2	9 34.8	116.9	8 52.8	117.6	8 10.7	118.4	7 28.5	119.1	6 46.3	119.8
24	9 34.8	115.5	8 53.1	116.2	8 11.4	116.9	7 29.5	117.7	6 47.7	118.4	6 5.6	119.1
28	8 52.6	114.8	8 11.1	115.5	7 29.6	116.3	6 48.1	117.0	6 6.4	117.7	5 24.8	118.4
32	8 10.2	114.1	7 29.0	114.9	6 47.7	115.6	6 6.4	116.3	5 25.0	117.1	4 43.6	117.8
36	7 27.5	113.5	6 46.5	114.2	6 5.6	114.9	5 24.5	115.7	4 43.4	116.4	4 2.3	117.1
40	6 44.6	112.8	6 3.9	113.5	5 23.1	114.3	4 42.3	115.0	4 1.5	115.7	3 20.8	116.5
44	6 1.5	112.1	5 21.0	112.9	4 40.3	113.6	4 0.0	114.4	3 19.4	115.1	2 38.8	115.8
48	5 18.2	111.5	4 37.9	112.2	3 57.6	113.0	3 17.3	113.7	2 37.0	114.4	1 56.7	115.2
52	4 34.7	110.8	3 54.7	111.6	3 14.6	112.3	2 34.5	113.1	1 54.4	113.8	1 14.3	114.5
4 56	3 51.0	110.2	3 11.2	110.9	2 31.4	111.7	1 51.5	112.4	1 11.7	113.2	0 31.9	113.9
5 0	3 7.2	109.5	2 27.6	110.3	1 48.0	111.0	1 8.4	111.8	0 28.8	112.5		
4	2 23.1	108.9	1 43.7	109.6	1 4.4	110.4	0 25.0	111.1				
8	1 38.9	108.2	0 59.8	109.0	0 20.5	109.8						
12	0 54.6	107.6	0 15.6	108.4								
16	0 10.0	107.0										
20												
24												
28												
32												
36												
40												
44												
48												
52												
5 56												
6 0												

SOUTH DECLINATION

Hour Angle.	19°		20°		21°		22°		23°		24°	
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.
h. m	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
0 0	32 0.0	180.0	31 0.0	180.0	30 0.0	180.0	29 0.0	180.0	28 0.0	180.0	27 0.0	180.0
4	31 59.6	178.9	30 59.6	178.9	29 59.6	178.9	28 59.6	178.9	27 59.6	179.0	26 59.6	178.9
8	31 58.3	177.8	30 58.3	177.8	29 58.3	177.8	28 58.3	177.9	27 58.3	177.9	26 58.3	177.9
12	31 56.0	176.7	30 56.1	176.7	29 56.1	176.8	28 56.2	176.8	27 56.2	176.9	26 56.3	176.9
16	31 52.8	175.5	30 53.0	175.6	29 53.1	175.7	28 53.2	175.8	27 53.2	175.8	26 53.3	175.9
20	31 48.7	174.4	30 48.9	174.5	29 49.1	174.6	28 49.3	174.7	27 49.4	174.8	26 49.6	174.9
24	31 43.7	173.3	30 44.0	173.4	29 44.3	173.6	28 44.6	173.7	27 44.8	173.8	26 45.1	173.8
28	31 37.8	172.2	30 38.2	172.4	29 38.6	172.5	28 39.0	172.6	27 39.3	172.7	26 39.7	172.8
32	31 31.1	171.1	30 31.6	171.3	29 32.1	171.4	28 32.6	171.6	27 33.0	171.7	26 33.4	171.8
36	31 23.5	170.0	30 24.1	170.2	29 24.7	170.4	28 25.3	170.5	27 25.8	170.7	26 26.4	170.8
40	31 14.9	168.9	30 15.7	169.1	29 16.5	169.3	28 17.2	169.5	27 17.9	169.6	26 18.6	169.8
44	31 5.5	167.8	30 6.4	168.0	29 7.3	168.2	28 8.1	168.4	27 9.0	168.6	26 9.8	168.8
48	30 55.3	166.8	29 56.4	167.0	28 57.4	167.2	27 58.5	167.4	26 59.5	167.6	26 0.5	167.8
52	30 44.2	165.7	29 45.4	165.9	28 46.7	166.1	27 47.8	166.4	26 49.0	166.6	25 50.1	166.8
0 56	30 32.2	164.6	29 33.7	164.8	28 35.1	165.1	27 36.5	165.3	26 37.8	165.6	25 39.0	165.8
1 0	30 19.4	163.5	29 21.2	163.8	28 22.7	164.1	27 24.2	164.3	26 25.8	164.6	25 27.3	164.8
4	30 5.8	162.5	29 7.7	162.8	28 9.5	163.0	27 11.2	163.3	26 13.0	163.6	25 14.7	163.8
8	29 51.4	161.4	28 53.5	161.7	27 55.5	162.0	26 57.5	162.3	25 59.5	162.6	25 1.4	162.9
12	29 36.1	160.4	28 38.4	160.7	27 40.7	161.0	26 42.9	161.3	25 45.1	161.6	24 47.2	161.9
16	29 20.1	159.3	28 22.6	159.7	27 25.1	160.0	26 27.5	160.3	25 29.9	160.6	24 32.3	160.9
20	29 3.1	158.3	28 5.9	158.6	27 8.7	159.0	26 11.4	159.3	25 14.1	159.6	24 16.7	160.0
24	28 45.6	157.3	27 48.7	157.6	26 51.7	158.0	25 54.6	158.3	24 57.5	158.7	24 0.4	159.0
28	28 27.1	156.3	27 30.5	156.6	26 33.8	157.0	25 37.0	157.4	24 40.1	157.7	23 43.3	158.1
32	28 8.0	155.3	27 11.6	155.6	26 15.2	156.0	25 18.7	156.4	24 22.1	156.8	23 25.5	157.1
36	27 48.0	154.2	26 52.0	154.6	25 55.9	155.0	24 59.6	155.4	24 3.4	155.8	23 7.0	156.2
40	27 27.5	153.2	26 31.7	153.7	25 35.8	154.1	24 39.9	154.5	23 43.9	154.9	22 47.9	155.2
44	27 6.1	152.3	26 10.6	152.7	25 15.2	153.1	24 19.4	153.5	23 23.7	153.9	22 27.9	154.3
48	26 44.0	151.3	25 48.8	151.7	24 53.6	152.2	23 58.3	152.6	23 2.9	153.0	22 7.5	153.4
52	26 21.3	150.3	25 26.4	150.8	24 31.5	151.2	23 36.5	151.7	22 41.5	152.1	21 46.5	152.5
1 56	25 57.8	149.3	25 3.3	149.8	24 8.7	150.3	23 14.0	150.7	22 19.2	151.2	21 24.4	151.6
2 0	25 33.7	148.4	24 39.5	148.9	23 45.3	149.4	22 50.9	149.8	21 56.4	150.3	21 2.0	150.7
4	25 9.0	147.5	24 15.1	147.9	23 21.2	148.4	22 27.1	148.9	21 33.0	149.4	20 38.8	149.8
8	24 43.6	146.5	23 50.1	147.0	22 56.5	147.5	22 2.7	148.0	21 8.9	148.5	20 15.0	148.9
12	24 17.5	145.6	23 24.3	146.1	22 31.0	146.6	21 37.7	147.1	20 44.2	147.6	19 50.6	148.1
16	23 50.9	144.7	22 58.1	145.2	22 5.1	145.7	21 12.1	146.2	20 18.9	146.7	19 25.7	147.2
20	23 23.6	143.8	22 31.1	144.3	21 38.5	144.8	20 45.8	145.3	19 53.0	145.9	19 0.1	146.4
24	22 55.8	142.9	22 3.6	143.4	21 11.4	144.0	20 19.0	144.5	19 26.6	145.0	18 34.0	145.5
28	22 27.4	142.0	21 35.5	142.6	20 43.6	143.1	19 51.6	143.6	18 59.5	144.1	18 7.3	144.7
32	21 58.4	141.1	21 6.9	141.7	20 15.3	142.2	19 23.7	142.8	18 32.0	143.3	17 40.1	143.8
36	21 28.8	140.3	20 37.7	140.8	19 46.5	141.4	18 55.1	141.9	18 3.8	142.5	17 12.2	143.0
40	20 58.6	139.4	20 7.9	140.0	19 17.1	140.5	18 26.2	141.1	17 35.1	141.6	16 44.0	142.2
44	20 28.1	138.6	19 37.7	139.1	18 47.2	139.7	17 56.6	140.3	17 5.9	140.8	16 15.1	141.4
48	19 57.0	137.7	19 7.0	138.3	18 16.9	138.9	17 26.6	139.5	16 36.2	140.0	15 45.7	140.6
52	19 25.3	136.9	18 35.6	137.5	17 45.9	138.1	16 56.0	138.6	16 6.0	139.2	15 15.9	139.8
2 56	18 53.1	136.0	18 3.9	136.7	17 14.4	137.2	16 24.9	137.8	15 35.2	138.4	14 45.5	139.0
3 0	18 20.6	135.2	17 31.6	135.8	16 42.6	136.4	15 53.3	137.0	15 4.0	137.6	14 14.6	138.2
4	17 47.5	134.4	16 58.9	135.0	16 10.2	135.6	15 21.3	136.2	14 32.4	136.8	13 43.3	137.4
8	17 13.9	133.6	16 25.6	134.2	15 37.3	134.9	14 48.8	135.5	14 0.3	136.1	13 11.6	136.7
12	16 40.0	132.8	15 52.1	133.5	15 4.1	134.1	14 15.9	134.7	13 27.7	135.3	12 39.3	135.9
16	16 5.6	132.0	15 18.0	132.7	14 30.3	133.3	13 42.5	133.9	12 54.6	134.6	12 6.7	135.2
20	15 30.7	131.3	14 43.5	131.9	13 56.2	132.5	13 8.7	133.2	12 21.1	133.8	11 33.6	134.4
24	14 55.5	130.5	14 8.6	131.1	13 21.6	131.8	12 34.5	132.4	11 47.3	133.1	11 0.0	133.7
28	14 19.8	129.7	13 33.3	130.4	12 46.7	131.0	11 59.9	131.7	11 13.0	132.3	10 26.1	133.0
32	13 43.8	129.0	12 57.6	129.6	12 11.3	130.3	11 24.9	130.9	10 38.4	131.6	9 51.8	132.2
36	13 7.3	128.2	12 21.4	128.9	11 35.5	129.6	10 49.4	130.2	10 3.3	130.9	9 17.0	131.5
40	12 30.6	127.5	11 45.0	128.2	10 59.4	128.8	10 13.6	129.5	9 27.8	130.2	8 41.9	130.8
44	11 53.3	126.8	11 8.2	127.5	10 22.9	128.1	9 37.5	128.8	8 52.0	129.4	8 6.5	130.1
48	11 15.8	126.1	10 31.0	126.7	9 46.0	127.4	9 0.9	128.1	8 15.8	128.7	7 30.6	129.4
52	10 37.9	125.3	9 53.4	126.0	9 8.8	126.7	8 24.0	127.4	7 39.2	128.0	6 54.4	128.7
3 56	9 59.7	124.6	9 15.5	125.3	8 31.2	126.0	7 46.8	126.7	7 2.3	127.4	6 17.8	128.0
4 0	9 21.2	123.9	8 37.3	124.6	7 53.3	125.3	7 9.2	126.0	6 25.1	126.7	5 40.9	127.3
4	8 42.4	123.2	7 58.8	123.9	7 15.1	124.6	6 31.4	125.3	5 47.6	126.0	5 3.7	126.7
8	8 3.2	122.5	7 19.9	123.2	6 36.5	123.9	5 53.1	124.6	5 9.6	125.3	4 26.1	126.0
12	7 23.7	121.8	6 40.7	122.6	5 57.7	123.3	5 14.6	124.0	4 31.4	124.6	3 48.2	125.3
16	6 53.9	121.2	6 1.3	121.9	5 18.6	122.6	4 35.7	123.3	3 53.0	124.0	3 10.1	124.7
20	6 3.9	120.5	5 21.6	121.2	4 39.1	121.9	3 56.6	122.6	3 14.1	123.3	2 31.5	124.0
24	5 23.6	119.8	4 41.5	120.5	3 59.4	121.3	3 17.2	122.0	2 35.0	122.7	1 52.8	123.4
28	4 43.0	119.2	4 1.2	119.9	3 19.4	120.6	2 37.5	121.3	1 55.6	122.0	1 13.7	122.8
32	4 2.1	118.5	3 20.6	119.2	2 39.1	120.0	1 57.5	120.7	1 15.9	121.4	0 34.3	122.1
36	3 21.0	117.9	2 39.8	118.6	1 58.6	119.3	1 17.3	120.0	0 36.0	120.8		
40	2 39.7	117.2	1 58.7	117.9	1 17.8	118.7	0 36.8	119.4				
44	1 58.1	116.6	1 17.5	117.3	0 36.8	118.0						
48	1 16.3	115.9	0 35.9	116.7								
52	0 34.4	115.3										
4 56												
5 0												
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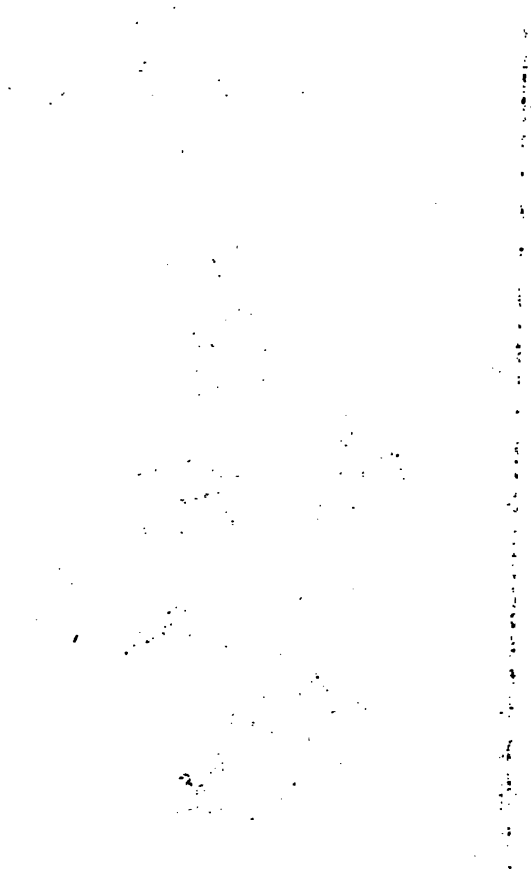
5 56												
6 0												

Hour Angle	α Tauri Aldebaran		β Orionis Rigel		α Aurigæ Capella		α Orionis Betelgeux		α Can. Maj. Sirius		α Can. Min. Procyon		β P
	Dec. +16° 20′.8		Dec. −8° 17′.7		Dec. +45° 55′.0		Dec. +7° 23′.6		Dec. −16° 36′.3		Dec. +5° 26′.0		Dec. +
	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.
h. m.	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′
0 0	67 20.8	180.0	42 42.3	180.0	83 5.0	0.0	58 23.6	180.0	34 23.7	180.0	56 26.0	180.0	79 23.
4	67 19.7	177.5	42 41.8	178.7	83 2.6	5.8	58 22.9	178.1	34 23.2	178.8	56 25.4	178.2	79 21.
8	67 16.8	175.0	42 40.2	177.3	82 55.7	11.4	58 20.7	176.2	34 21.9	177.7	56 23.2	176.4	79 5.
12	67 11.7	172.5	42 37.4	176.0	82 44.2	16.8	58 16.8	174.3	34 19.5	176.5	56 19.6	174.6	78 36.
16	67 4.7	170.1	42 33.6	174.6	82 28.8	21.8	58 11.5	172.5	34 16.1	175.4	56 14.4	172.8	78 43.
20	66 55.6	167.7	42 28.6	173.3	82 9.8	26.4	58 4.6	170.6	34 11.8	174.2	56 7.8	171.0	78 27.
24	66 44.5	165.3	42 22.7	172.0	81 47.6	30.6	57 56.2	168.7	34 6.8	173.1	56 0.0	169.3	78 7.
28	66 31.9	162.9	42 15.6	170.6	81 22.4	34.4	57 46.3	167.9	34 0.5	171.9	55 50.1	167.5	77 45.
32	66 17.3	160.6	42 7.5	169.3	80 54.9	37.8	57 35.0	165.1	33 53.6	170.8	55 39.8	165.8	77 20.
36	66 1.0	158.3	41 58.3	168.0	80 25.3	40.9	57 22.4	163.3	33 45.6	169.6	55 27.6	164.1	76 53.
40	65 42.9	156.1	41 48.1	166.7	79 53.9	43.6	57 8.3	161.5	33 36.7	168.5	55 14.1	162.4	76 24.
44	65 23.2	153.9	41 36.8	165.4	79 21.0	45.9	56 52.8	159.7	33 26.9	167.4	54 59.2	160.7	75 52.
48	65 1.9	151.8	41 24.5	164.1	78 46.9	48.0	56 35.9	158.0	33 16.3	166.2	54 43.1	159.0	75 19.
52	64 39.2	149.7	41 11.3	162.8	78 11.7	49.9	56 17.8	156.3	33 4.0	165.1	54 25.8	157.4	74 45.
0 56	64 14.9	147.7	40 57.0	161.5	77 35.8	51.6	55 58.4	154.6	32 52.3	164.0	54 7.3	155.7	74 9.
1 0	63 49.3	145.7	40 41.7	160.3	76 58.9	53.1	55 37.9	153.0	32 39.0	162.9	53 47.6	154.1	73 32.
4	63 22.4	143.8	40 25.4	159.0	76 21.2	54.4	55 16.0	151.3	32 24.8	161.8	53 26.7	152.6	72 54.
8	62 54.3	142.0	40 8.3	157.8	75 43.0	55.5	54 53.1	149.7	32 9.8	160.7	53 4.6	151.0	72 15.
12	62 24.9	140.2	39 50.2	156.5	75 4.3	56.6	54 29.0	148.2	31 54.0	159.6	52 41.5	149.5	71 35.
16	61 54.5	138.4	39 31.2	155.3	74 25.3	57.5	54 3.9	146.6	31 37.4	158.5	52 17.2	148.0	70 55.
20	61 23.1	136.7	39 11.3	154.1	73 45.6	58.3	53 37.8	145.1	31 19.9	157.4	51 52.0	146.5	70 13.
24	60 50.6	135.1	38 50.5	152.9	73 5.7	59.0	53 10.6	143.6	31 1.6	156.4	51 25.9	145.1	69 31.
28	60 17.3	133.5	38 28.8	151.7	72 25.8	59.7	52 42.5	142.2	30 42.5	155.3	50 58.7	143.7	68 49.
32	59 43.0	132.0	38 6.3	150.6	71 45.4	60.3	52 13.4	140.8	30 22.6	154.3	50 30.6	142.3	68 6.
36	59 8.0	130.5	37 43.0	149.4	71 4.7	60.8	51 43.5	139.4	30 2.0	153.2	50 1.6	140.9	67 23.
40	58 32.1	129.0	37 18.9	148.3	70 23.8	61.2	51 12.7	138.0	29 40.6	152.2	49 31.8	139.6	66 39.
44	57 55.5	127.6	36 53.9	147.1	69 42.9	61.6	50 41.2	136.7	29 18.6	151.2	49 1.2	138.3	65 55.
48	57 18.2	126.2	36 28.3	146.0	69 2.0	62.0	50 8.7	135.4	28 55.7	150.2	48 29.8	137.0	65 11.
52	56 40.3	124.9	36 1.8	144.9	68 20.8	62.3	49 35.5	134.1	28 32.2	149.2	47 57.6	135.7	64 26.
1 56	56 1.8	123.6	35 34.7	143.9	67 39.4	62.5	49 1.7	132.8	28 8.0	148.2	47 24.7	134.5	63 42.
2 0	55 22.7	122.4	35 6.8	142.8	66 58.0	62.8	48 27.2	131.6	27 43.2	147.2	46 51.0	133.3	62 57.
4	54 43.0	121.2	34 38.3	141.7	66 16.5	63.0	47 52.0	130.4	27 17.6	146.3	46 16.8	132.1	62 12.
8	54 2.9	120.0	34 9.1	140.7	65 34.8	63.1	47 16.2	129.3	26 51.4	145.3	45 42.9	130.9	61 26.
12	53 22.3	118.8	33 39.2	139.7	64 53.3	63.2	46 39.8	128.1	26 24.5	144.4	45 6.4	129.8	60 40.
16	52 41.2	117.7	33 8.6	138.6	64 11.8	63.3	46 2.8	127.0	25 57.0	143.4	44 30.3	128.7	59 53.
20	51 59.7	116.6	32 37.6	137.6	63 30.1	63.4	45 25.3	125.9	25 28.9	142.5	43 53.7	127.6	59 9.
24	51 17.9	115.6	32 5.8	136.6	62 48.2	63.5	44 47.2	124.8	25 0.2	141.6	43 16.4	126.5	58 23.
28	50 35.0	114.5	31 33.5	135.7	62 6.6	63.5	44 8.8	123.7	24 31.0	140.7	42 38.6	125.5	57 36.
32	49 53.1	113.5	31 0.7	134.7	61 24.7	63.5	43 29.8	122.7	24 1.1	139.8	42 0.4	124.4	56 50.
36	49 10.2	112.5	30 27.2	133.8	60 43.0	63.5	42 50.2	121.7	23 30.8	138.9	41 21.8	123.4	56 4.
40	48 26.9	111.6	29 53.3	132.8	60 1.3	63.5	42 10.3	120.7	22 59.8	138.0	40 42.6	122.4	55 18.
44	47 43.4	110.6	29 18.8	131.9	59 19.6	63.5	41 30.1	119.7	22 28.3	137.1	40 3.0	121.4	54 31.
48	46 59.6	109.7	28 43.8	131.0	58 38.0	63.4	40 49.3	118.7	21 56.3	136.3	39 23.1	120.5	53 45.
52	46 15.6	108.8	28 8.4	130.1	57 56.3	63.4	40 8.3	117.8	21 23.8	135.4	38 42.7	119.5	52 58.
2 56	45 31.3	107.9	27 32.5	129.2	57 14.6	63.3	39 26.8	116.9	20 50.9	134.6	38 2.0	118.6	52 12.
3 0	44 47.0	107.1	26 56.1	128.3	56 32.9	63.2	38 45.2	116.0	20 17.4	133.7	37 20.8	117.7	51 25.
4	44 2.2	106.2	26 19.3	127.4	55 51.4	63.1	38 3.0	115.1	19 43.3	132.9	36 39.3	116.8	50 39.
8	43 17.4	105.4	25 42.1	126.6	55 9.7	63.0	37 20.6	114.2	19 9.2	132.1	35 57.6	115.9	49 52.
12	42 32.3	104.6	25 4.4	125.7	54 28.2	62.8	36 37.9	113.3	18 34.3	131.3	35 15.3	115.1	49 5.
16	41 47.1	103.8	24 26.4	124.9	53 46.8	62.7	35 54.9	112.5	17 59.1	130.5	34 33.1	114.2	48 19.
20	41 1.7	103.0	23 47.9	124.1	53 5.4	62.6	35 11.7	111.6	17 23.4	129.7	33 50.4	113.4	47 32.
24	40 16.3	102.2	23 9.1	123.2	52 24.0	62.4	34 28.2	110.8	16 47.3	128.9	33 7.4	112.5	46 45.
28	39 30.6	101.5	22 29.9	122.4	51 42.8	62.2	33 44.5	110.0	16 10.9	128.2	32 24.3	111.7	45 59.
32	38 44.9	100.7	21 50.4	121.6	51 1.5	62.1	33 0.7	109.2	15 34.0	127.4	31 40.8	110.9	45 12.
36	37 59.0	99.9	21 10.5	120.9	50 20.3	61.9	32 16.5	108.4	14 56.7	126.6	30 57.2	110.1	44 26.
40	37 13.0	99.2	20 30.4	120.1	49 39.3	61.7	31 32.1	107.6	14 19.2	125.9	30 13.2	109.3	43 39.
44	36 26.9	98.5	19 49.8	119.3	48 58.2	61.5	30 47.6	106.9	13 41.2	125.2	29 29.0	108.5	42 53.
48	35 40.8	97.8	19 9.0	118.5	48 17.3	61.3	30 2.9	106.1	13 2.9	124.4	28 44.9	107.7	42 6.
52	34 54.6	97.1	18 28.0	117.8	47 36.4	61.0	29 18.0	105.4	12 24.3	123.7	28 0.4	107.0	41 20.
3 56	34 8.4	96.4	17 46.3	117.0	46 55.7	60.8	28 32.9	104.6	11 45.4	123.0	27 15.6	106.3	40 33.
4 0	33 22.0	95.7	17 4.8	116.3	46 15.0	60.6	27 47.8	103.9	11 5.9	122.3	26 30.8	105.5	39 47.
4	32 35.5	95.0	16 22.9	115.6	45 34.4	60.4	27 2.4	103.2	10 26.4	121.6	25 45.8	104.8	39 1.
8	31 49.0	94.4	15 40.7	114.8	44 54.0	60.1	26 17.0	102.4	9 46.6	120.9	25 0.7	104.1	38 14.
12	31 2.3	93.7	14 58.4	114.1	44 13.7	59.9	25 31.3	101.7	9 6.4	120.2	24 15.3	103.4	37 28.
16	30 16.0	93.1	14 15.6	113.4	43 33.4	59.6	24 45.6	101.0	8 26.0	119.5	23 30.0	102.7	36 42.
20	29 29.4	92.4	13 32.8	112.7	42 53.2	59.4	23 59.9	100.3	7 45.3	118.8	22 44.4	102.0	33 56.
24	28 42.8	91.8	12 49.6	112.0	42 13.1	59.1	23 13.9	99.6	7 4.3	118.1	21 58.7	101.3	35 10.
28	27 56.2	91.1	12 6.3	111.3	41 33.1	58.9	22 27.9	99.0	6 23.0	117.4	21 12.9	100.6	34 24.
32	27 9.6	90.5	11 22.8	110.6	40 53.3	58.6	21 41.8	98.3	5 41.4	116.8	20 27.1	99.9	33 39.
36	26 23.0	89.9	10 39.0	110.0	40 13.6	58.3	20 55.6	97.6	4 59.8	116.1	19 41.1	99.2	32 53.
40	25 36.3	89.2	9 55.0	109.3	39 34.0	58.0	20 9.4	96.9	4 17.6	115.4	18 55.0	98.6	32 7.
44	24 49.7	88.6	9 11.0	108.6	38 54.4	57.7	19 23.0	96.3	3 35.4	114.8	18 8.9	97.9	31 22.
48	24 3.1	88.0	8 26.7	107.9	38 15.1	57.4	18 36.6	95.6	2 52.9	114.2	17 22.7	97.2	30 36.
52	23 16.6	87.4	7 42.2	107.3	37 35.9	57.1	17 50.2	95.0	2 10.2	113.5	16 36.4	96.6	29 52.
4 56	22 29.9	86.8	6 57.6	106.6	36 56.8	56.8	17 3.8	94.3	1 27.4	112.9	15 50.1	95.9	29 6.
5 0	21 43.5	86.2	6 12.9	106.0	36 17.9	56.5	16 17.3	93.7	0 44.4	112.3	15 3.6	95.3	28 20.
4	20 56.9	85.5	5 28.0	105.3	35 39.1	56.2	15 30.7	93.0	0 1.2	111.6	14 17.1	94.6	27 35.
8	20 10.4	84.9	4 42.9	104.7	35 0.4	55.9	14 44.1	92.4			13 30.7	94.0	26 50.
12	19 24.1	84.3	3 57.7	104.0	34 21.9	55.5	13 57.3	91.8			12 44.1	93.3	26 6.
16	18 37.6	83.7	3 12.5	103.4	33 43.5	55.2	13 10.9	91.1			11 57.6	92.7	25 21.
20	17 51.3	83.1	2 27.0	102.8	33 5.3	54.9	12 24.3	90.5			11 11.0	92.1	24 36.
24	17 5.0	82.5	1 41.5	102.1	32 27.2	54.5	11 37.7	89.9			10 24.4	91.4	23 52.
28	16 18.9	81.9	0 55.9	101.5	31 49.4	54.2	10 51.1	89.2			9 37.8	90.8	23 8.
32	15 32.7	81.4	0 10.3	100.9	31 11.6	53.8	10 4.4	88.6			8 51.1	90.2	22 24.
36	14 46.6	80.8			30 34.1	53.5	9 17.8	88.0			8 4.5	89.5	21 39.
40	14 0.6	80.2			29 56.8	53.1	8 31.2	87.3			7 17.9	88.9	20 56.
44	13 14.8	79.6			29 19.6	52.8	7 44.7	86.7			6 31.3	88.3	20 12.
48	12 28.9	79.0			28 42.5	52.4	6 58.2	86.1			5 44.7	87.6	19 28.
52	11 43.3	78.4			28 5.7	52.0	6 11.8	85.5			4 58.1	87.0	18 43.
5 56	10 57.5	77.8			27 29.0	51.6	5 25.2	84.9			4 11.6	86.4	18 0.
6 0	10 12.0	77.2			26 52.6	51.3	4 38.6	84.3			3 25.0	85.8	17 16.

Virginis Spica		α Boötis Arcturus		α Scorpii Antares		α Lyræ Vega		α Aquilæ Altair		α Cygni Deneb		α Piſc. Aust. Fomalhaut		Hour Angle
-10° 44′.3		Dec.+19° 36′.3		Dec.−26° 15′.2		Dec.+38° 42′.4		Dec.+8° 39 .2		Dec.+44° 59′.4		Dec.−30° 03′.2		
	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	
	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	° ′	°	h. m.
7	180.0	70 36.3	180.0	24 44.8	180.0	89 42.4	180.0	59 39.2	180.0	84 0.6	0.0	20 56.8	180.0	0 0
1	178.7	70 35.3	177.1	24 44.4	179.0	89 4.7	110.3	59 38.4	178.0	83 57.8	13.2	20 56.4	179.0	4
7	177.4	70 31.9	174.3	24 43.2	178.0	88 21.5	100.0	59 36.1	176.1	83 49.8	13.3	20 55.2	178.1	8
0	176.1	70 26.2	171.5	24 41.2	177.0	87 36.3	96.2	59 32.1	174.1	83 36.5	19.4	20 53.4	177.2	12
4	174.9	70 18.1	168.8	24 38.4	176.0	86 50.4	94.1	59 26.7	172.2	83 18.8	25.1	20 50.8	176.3	16
6	173.6	70 7.9	166.0	24 34.8	175.0	86 4.1	92.7	59 19.5	170.3	82 57.0	38.2	20 47.3	175.4	20
9	172.3	69 55.6	163.3	24 30.4	174.0	85 17.8	91.7	59 10.9	168.4	82 31.9	34.7	20 43.3	174.4	24
2	171.0	69 41.1	160.7	24 25.2	173.0	84 31.4	90.9	59 0.8	166.5	82 4.0	38.7	20 38.4	173.5	28
3	169.8	69 24.8	158.1	24 19.2	172.0	83 44.8	90.2	58 49.0	164.6	81 34.1	42.2	20 32.8	172.6	32
5	168.5	69 6.3	155.6	24 12.4	171.1	82 58.2	89.6	58 36.0	162.7	81 1.9	45.2	20 26.4	171.7	36
7	167.3	68 46.3	153.1	24 4.9	170.2	82 11.6	89.0	58 21.3	160.9	80 28.0	47.9	20 19.3	170.8	40
0	166.0	68 24.2	150.8	23 56.5	169.2	81 25.2	88.5	58 5.5	159.1	79 52.9	50.2	20 11.4	169.8	44
2	164.8	68 0.7	148.5	23 47.4	168.2	80 38.7	88.0	57 48.1	157.3	79 16.3	52.2	20 2.9	168.9	48
5	163.5	67 35.5	146.2	23 37.5	167.2	79 52.1	87.6	57 29.5	155.6	78 39.1	54.0	19 53.5	168.0	52
7	162.3	67 8.7	144.1	23 26.8	166.3	79 5.6	87.1	57 9.4	153.8	78 1.2	55.5	19 43.5	167.1	0 56
1	161.1	66 40.7	142.0	23 15.5	165.4	78 19.2	86.7	56 48.3	152.2	77 22.4	56.9	19 32.8	166.2	1 0
6	159.9	66 11.4	140.0	23 3.3	164.4	77 32.8	86.3	56 25.9	150.5	76 43.1	58.1	19 21.4	165.3	4
1	158.7	65 40.8	138.0	22 50.4	163.5	76 46.3	85.9	56 2.4	148.9	76 3.3	59.1	19 9.3	164.4	8
6	157.5	65 9.0	136.1	22 36.8	162.6	75 59.7	85.5	55 37.6	147.3	75 23.0	60.0	18 56.4	163.5	12
3	156.4	64 36.2	134.3	22 22.4	161.6	75 13.2	85.1	55 11.9	145.7	74 42.4	60.8	18 42.9	162.6	16
2	155.2	64 2.3	132.6	22 7.4	160.7	74 26.8	84.8	54 45.1	144.1	74 1.6	61.5	18 28.6	161.8	20
2	154.0	63 27.6	130.9	21 51.6	159.7	73 40.5	84.4	54 17.3	142.6	73 20.6	62.2	18 13.8	160.9	24
4	152.9	62 51.9	129.3	21 35.1	158.8	72 54.2	84.0	53 48.5	141.2	72 39.3	62.7	17 58.2	160.1	28
7	151.7	62 15.5	127.7	21 17.8	157.9	72 7.8	83.7	53 18.7	139.7	71 57.7	63.2	17 41.9	159.2	32
2	150.6	61 38.2	126.2	21 0.0	157.0	71 21.4	83.3	52 48.3	138.3	71 16.1	63.6	17 25.1	158.3	36
9	149.5	61 0.3	124.7	20 41.5	156.1	70 35.1	82.9	52 16.8	136.9	70 34.2	64.0	17 7.6	157.5	40
9	148.4	60 21.6	123.4	20 22.2	155.2	69 48.9	82.6	51 44.5	135.6	69 52.3	64.3	16 49.4	156.6	44
1	147.4	59 42.4	122.0	20 2.3	154.3	69 2.7	82.2	51 11.5	134.3	69 10.2	64.6	16 30.6	155.8	48
6	146.3	59 2.5	120.7	19 41.8	153.4	68 16.5	81.9	50 37.8	133.0	68 28.1	64.8	16 11.2	155.0	52
4	145.2	58 22.2	119.4	19 20.6	152.6	67 30.3	81.5	50 3.3	131.7	67 45.8	65.0	15 51.1	154.1	1 56
3	144.2	57 41.4	118.2	18 58.8	151.7	66 44.2	81.2	49 28.1	130.5	67 3.5	65.1	15 30.5	153.3	2 0
7	143.1	57 0.0	117.0	18 36.4	150.8	65 58.3	80.8	48 52.4	129.3	66 21.3	65.3	15 9.2	152.5	4
4	142.1	56 18.4	115.9	18 13.3	150.0	65 12.2	80.5	48 15.9	128.1	65 38.9	65.4	14 47.5	151.7	8
4	141.1	55 36.2	114.7	17 49.6	149.1	64 26.3	80.1	47 38.9	126.9	64 56.4	65.4	14 25.0	150.9	12
8	140.1	54 53.6	113.6	17 25.5	148.3	63 40.5	79.8	47 1.4	125.8	64 14.1	65.5	14 2.1	150.1	16
7	139.1	54 10.7	112.6	17 0.7	147.4	62 54.6	79.4	46 23.4	124.7	63 31.6	65.5	13 38.5	149.3	20
9	138.2	53 27.6	111.6	16 35.3	146.6	62 8.7	79.0	45 44.8	123.6	62 49.2	65.5	13 14.4	148.5	24
5	137.2	52 44.0	110.6	16 9.4	145.8	61 23.0	78.7	45 5.9	122.6	62 6.7	65.5	12 49.7	147.7	28
5	136.3	52 0.2	109.6	15 42.9	145.0	60 37.3	78.3	44 26.2	121.5	61 24.3	65.5	12 24.6	146.9	32
0	135.3	51 16.2	108.6	15 16.0	144.2	59 51.7	78.0	43 46.2	120.5	60 42.0	65.4	11 58.9	146.2	36
0	134.4	50 31.9	107.7	14 48.4	143.4	59 6.1	77.6	43 5.8	119.5	59 59.6	65.4	11 32.6	145.4	40
3	133.5	49 47.3	106.8	14 20.4	142.6	58 20.6	77.3	42 25.1	118.5	59 17.2	65.3	11 5.9	144.6	44
2	132.6	49 2.6	105.9	13 51.8	141.8	57 35.2	76.9	41 43.9	117.6	58 34.7	65.2	10 38.7	143.9	48
7	131.7	48 17.7	105.0	13 22.7	141.0	56 49.8	76.6	41 2.4	116.6	57 52.4	65.1	10 11.0	143.1	52
6	130.8	47 32.6	104.2	12 53.1	140.3	56 4.5	76.2	40 20.5	115.7	57 10.1	65.0	9 42.8	142.4	2 56
1	130.0	46 47.2	103.4	12 23.0	139.5	55 19.2	75.9	39 38.4	114.8	56 28.0	64.9	9 14.1	141.7	3 0
2	129.1	46 1.8	102.6	11 52.6	138.7	54 33.9	75.5	38 56.0	113.9	55 45.8	64.7	8 44.9	140.9	4
7	128.3	45 16.2	101.8	11 21.6	138.0	53 48.9	75.2	38 13.2	113.0	55 3.7	64.6	8 15.3	140.2	8
9	127.4	44 30.6	101.0	10 50.2	137.3	53 3.8	74.8	37 30.1	112.2	54 21.6	64.4	7 45.2	139.5	12
8	126.6	43 44.6	100.2	10 18.4	136.5	52 18.8	74.4	36 46.8	111.3	53 39.5	64.3	7 14.8	138.8	16
1	125.8	42 58.7	99.5	9 46.1	135.8	51 34.0	74.1	36 3.1	110.5	52 57.6	64.1	6 43.9	138.1	20
0	125.0	42 12.8	98.7	9 13.3	135.1	50 49.2	73.7	35 19.4	109.7	52 15.7	63.9	6 12.5	137.4	24
6	124.2	41 26.6	98.0	8 40.2	134.4	50 4.5	73.4	34 35.3	108.9	51 33.8	63.7	5 40.8	136.7	28
9	123.4	40 40.4	97.3	8 6.6	133.6	49 19.8	73.0	33 51.1	108.1	50 52.1	63.5	5 8.7	136.0	32
8	122.6	39 54.0	96.6	7 32.7	132.9	48 35.3	72.6	33 6.7	107.3	50 10.4	63.3	4 36.1	135.4	36
3	121.8	39 7.8	95.9	6 58.4	132.3	47 50.9	72.3	32 22.1	106.5	49 28.7	63.1	4 3.1	134.7	40
5	121.1	38 21.3	95.2	6 23.7	131.6	47 6.5	71.9	31 37.3	105.7	48 47.1	62.9	3 29.7	134.0	44
4	120.3	37 34.9	94.5	5 48.7	130.9	46 22.2	71.5	30 52.3	105.0	48 5.8	62.6	2 56.0	133.4	48
9	119.6	36 48.3	93.8	5 13.4	130.2	45 38.0	71.2	30 7.2	104.2	47 24.5	62.4	2 22.0	132.7	52
3	118.8	36 1.9	93.2	4 37.4	129.5	44 54.0	70.8	29 21.9	103.5	46 43.1	62.2	1 47.6	132.1	3 56
3	118.1	35 15.3	92.5	4 1.2	128.9	44 10.0	70.4	28 36.6	102.8	46 2.0	61.9	1 12.8	131.4	4 0
0	117.4	34 28.7	91.9	3 24.8	128.2	43 26.1	70.0	27 51.0	102.1	45 20.9	61.7	0 37.6	130.8	4
4	116.7	33 42.1	91.2	2 48.0	127.5	42 42.3	69.7	27 5.3	101.4	44 39.9	61.4	0 2.0	130.2	8
7	115.9	32 55.5	90.6	2 10.9	126.9	41 58.6	69.3	26 19.6	100.7	43 59.1	61.1			12
6	115.2	32 8.8	89.9	1 33.4	126.2	41 15.1	68.9	25 33.7	100.0	43 18.3	60.9			16
3	114.5	31 22.2	89.3	0 55.7	125.6	40 31.6	68.5	24 47.7	99.3	42 37.6	60.6			20
8	113.8	30 35.6	88.7	0 17.8	125.0	39 48.3	68.1	24 1.7	98.6	41 56.9	60.3			24
9	113.2	29 48.9	88.1			39 5.1	67.7	23 15.5	97.9	41 16.5	60.0			28
9	112.5	29 2.3	87.5			38 22.0	67.3	22 29.4	97.2	40 36.2	59.7			32
7	111.8	28 15.8	86.9			37 39.0	67.0	21 43.0	96.6	39 56.0	59.4			36
4	111.1	27 29.3	86.3			36 56.3	66.6	20 56.6	95.9	39 15.8	59.1			40
8	110.4	26 42.8	85.7			36 13.5	66.2	20 10.2	95.2	38 35.9	58.8			44
0	109.8	25 56.3	85.1			35 30.9	65.8	19 23.8	94.6	37 56.1	58.5			48
0	109.1	25 9.8	84.5			34 48.5	65.4	18 37.3	93.9	37 16.4	58.2			52
9	108.5	24 23.4	83.9			34 6.2	65.0	17 50.8	93.3	36 36.8	57.9			4 56
6	107.8	23 37.1	83.3			33 24.0	64.5	17 4.2	92.6	35 57.4	57.6			5 0
1	107.2	22 50.8	82.7			32 42.0	64.1	16 17.7	92.0	35 18.2	57.2			4
4	106.5	22 4.6	82.1			32 0.0	63.7	15 31.0	91.4	34 39.0	56.9			8
7	105.9	21 18.4	81.5			31 18.3	63.3	14 44.4	90.7	34 0.0	56.6			12
7	105.2	20 32.4	80.9			30 36.7	62.9	13 57.8	90.1	33 21.2	56.2			16
1	104.6	19 46.4	80.3			29 55.3	62.5	13 11.1	89.5	32 42.6	55.9			20
0	104.0	19 0.5	79.8			29 14.1	62.1	12 24.5	88.9	32 4.0	55.5			24
		18 14.6	79.2			28 33.0	61.6	11 38.0	88.2	31 25.7	55.2			28
		17 28.8	78.6			27 52.1	61.2	10 51.3	87.6	30 47.5	54.8			32
		16 43.2	78.0			27 11.3	60.8	10 4.7	87.0	30 9.5	54.4			36
		15 57.7	77.5			26 30.7	60.3	9 18.1	86.4	29 31.7	54.1			40
		15 12.2	76.9			25 50.3	59.9	8 31.7	85.7	28 54.0	53.7			44
		14 26.8	76.3			25 10.0	59.4	7 45.2	85.1	28 16.6	53.3			48
		13 41.6	75.7			24 29.9	59.0	6 58.8	84.5	27 39.2	52.9			52
		12 56.4	75.1			23 50.1	58.5	6 12.3	83.9	27 2.0	52.6			5 56
		12 11.4	74.5			23 10.5	58.1	5 26.0	83.3	26 25.1	52.2			6 0



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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

ONVENIENT METHOD OF HANDLING STEAMING DATA

By LIEUTENANT JULES JAMES, U. S. Navy

o provide a ready means of obtaining steaming data in con-ient form the curves below were prepared for one of the ships. h this set of curves and a report of coal on board, the command-officer will have, ready at hand, all the data necessary to solve steaming problems which arise from time to time.

hese curves were all made from data obtained from a perform-sheet furnished by the Office of Gunnery Exercises and ineering Performances. This performance sheet, illustrated ig. 1, was made from actual steaming data recorded during years 1910 to 1917 and represents performance under all sorts onditions of coal, boilers, bottoms, weather, etc. A similar t is furnished to all vessels of the navy.

he curve shown on this sheet (Fig. 1) was drawn by the author his article, is the average of the data plotted, and may be med to be the probable performance of the vessel under aver-conditions.

urves *A*, *B* and *C* were plotted from data taken from the curve g. 1) and converted into the proper co-ordinates, as shown by mns 1 to 7 in Table 1 on page 588.

urve *A* represents this curve plotted as the ordinary type of -consumption curve; that is, tons per day *vs.* knots per hour. l. 4 *vs.* col. 1.)

urves *B*, *C* and *D* are the same curves expressed in different rdinates merely to facilitate their uses.

urve *B* is a curve of miles per ton *vs.* knots per hour. (Col. 5 ol. 1.)

urve *C* is a curve of steaming radius *vs.* knots per hour. (Col. 6 ol. 1.)

urve *D* is a curve of R. P. M. *vs.* knots per hour. (Col. 8 *vs.* 1.) This curve was plotted from the R. P. M. card usually t on the bridge.

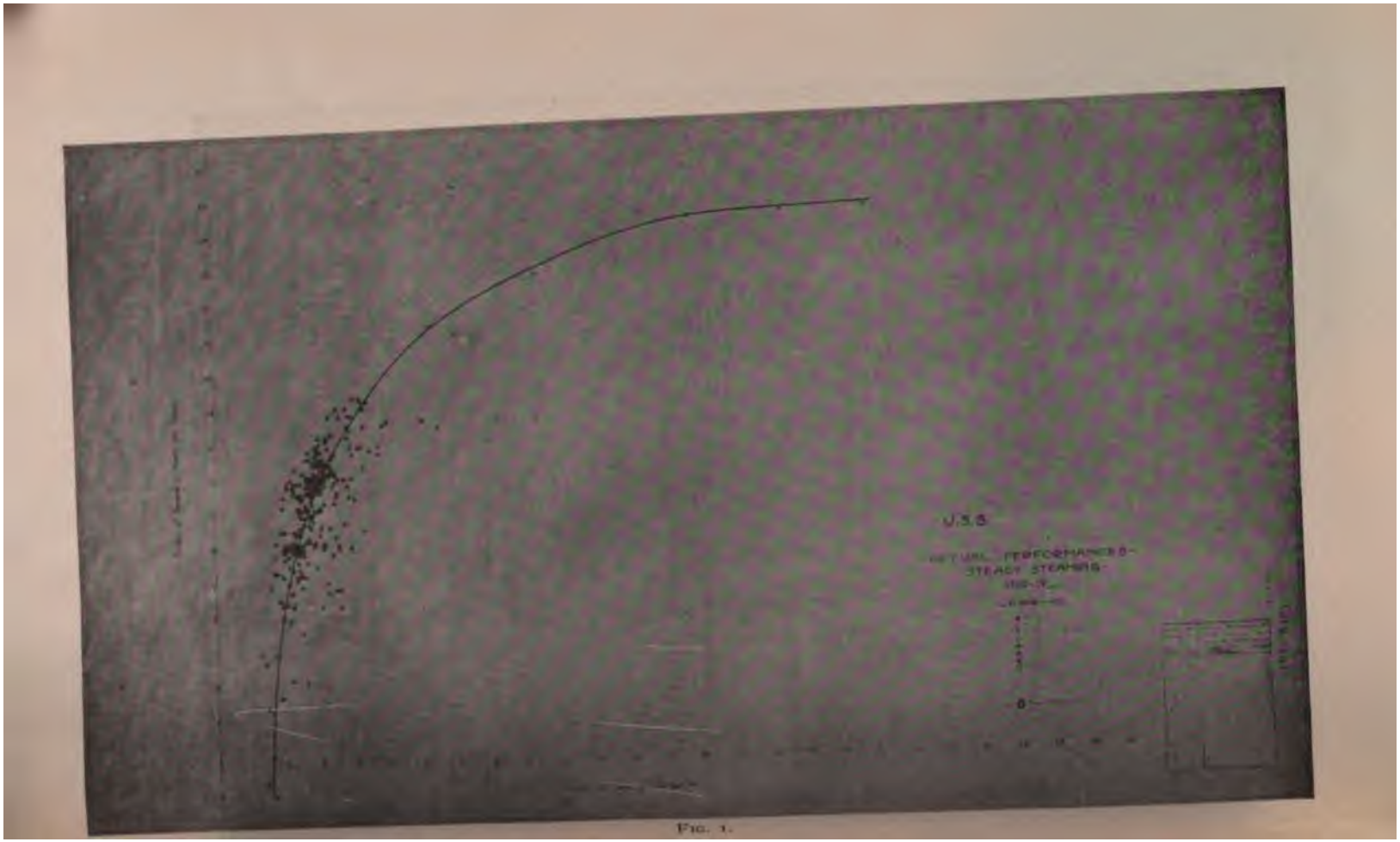


FIG. 1.

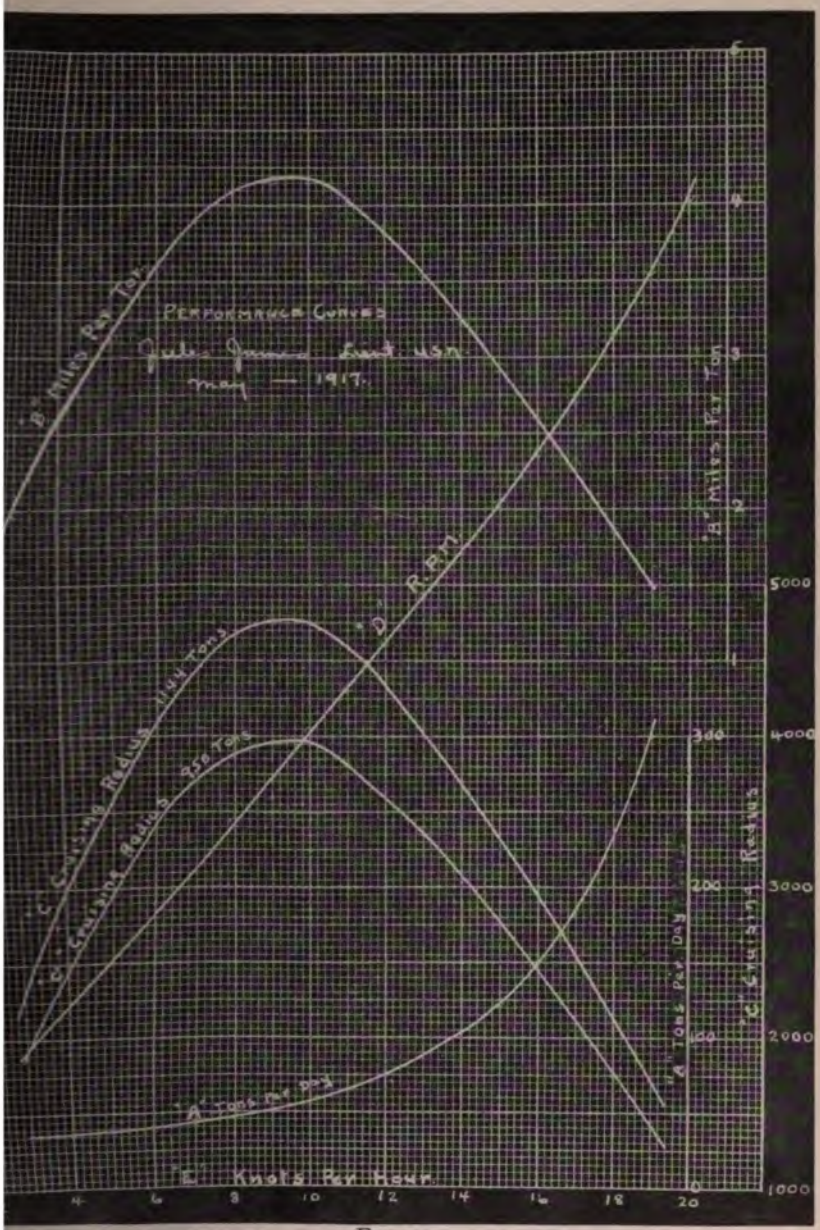

PERFORMANCE CURVES
May — 1917.
B' Miles Per Ton
C' Cruising Radius Light Tons
D' R.P.M.
B' Miles Per Ton
C' Cruising Radius
A' Tons Per Day
E' Knots Per Hour
5000
4000
3000
2000
1000
4
6
8
10
12
14
16
18
20

FIG. 2.

It is recommended that another curve *C'*, similar to *C* and just below it, be plotted in case certain bunkers are to be kept as reserve bunkers and not ordinarily used. (Col. 7 *vs.* col. 1.) The additional curve would be made out for a fuel capacity equal to the total minus the reserve. In this particular case the reserve is taken as 194 tons.

TABLE 1

Knots per hour	Miles per day Col. 1x24	Tons per hour curve Fig. 1	Tons per day Col. 3x24	Miles per ton Col. 2 Col. 4	Cruising radius 1144 tons Col. 5x1144	Cruising radius 950 tons Col. 5x950
3	72	1.510	36.24	1.990	2277	1891
4	96	1.550	37.20	2.580	2952	2451
5	120	1.600	28.40	3.125	3575	2969
6	144	1.675	40.20	3.582	4098	3403
7	168	1.790	42.96	3.911	4474	3715
8	192	1.955	46.92	4.092	4681	3888
9	216	2.165	51.96	4.157	4756	3949
10	240	2.425	57.66	4.162	4761	3954
11	264	2.735	65.64	4.022	4601	3821
12	288	3.125	75.20	3.840	4393	3648
13	312	3.670	88.08	3.542	4052	3365
14	336	4.330	103.92	3.233	3698	3071
15	360	5.120	122.88	2.930	3352	2784
16	384	6.140	147.37	2.606	2981	2476
17	408	7.630	183.12	2.228	2549	2117
18	432	9.780	234.72	1.841	2106	1749
19	456	12.650	303.60	1.502	1719	1427

It is evident that these curves are equally applicable to coal- and oil-burning vessels.

To illustrate the uses of the sheet, suppose the ship had to make a voyage of 1650 miles on 500 tons of coal. This is 3.3 miles per ton that must be made. A ruler laid across the sheet at 3.3 on the *B* scale cuts the *B* curve at 5.3 knots and at 13.9 knots on the *E* scale at the bottom, so any speed between these two can be used. These speeds give 32 and 84 R. P. M. respectively on curve *D*.

Or let us suppose the ship, with full bunkers, were to receive orders to leave Norfolk for a voyage of 2000 miles. The commanding officer wishes to make all speed possible, but not to draw on his reserve coal. Therefore he uses curve *C'* and entering from 2000 on the *C* scale a horizontal cuts the curve at 17.5 knots which is the maximum speed he can use. The R. P. M. curve shows that this speed is made at 107 R. P. M.

Let us suppose that outside he encounters a storm with consequent delay, and after a day's steaming finds that, having had to ride out the storm, he has used 150 tons of coal and still has 1800 miles to go. He now has available 800 tons to go 1800 miles; therefore, he must make 2¼ miles per ton of coal. Entering from 2¼ on the *B* scale a horizontal cuts the *B* curve at 16.9 knots per hour: so he is assured that if he slows to 16.9 knots he will make port under present conditions and with his reserve coal intact. Should he encounter another delay, he can again go to the curve and find out his new highest speed to enable him to reach port with his reserve coal. On the other hand, should he be set along his course he can go to the curve and in the same manner find out how much he can increase his speed.

If for any reason he wishes to steam at slow speeds he can continue his horizontal over to the other branch of the curve and find the lowest speed he can maintain to reach port.

If he wishes to reach port with the least expenditure of coal he simply has to look at *B* curve and see that between 9 and 10 knots he can make most miles per ton of coal expended. This place on the curve is clearly the economical speed.

Suppose the ship is under orders to proceed to sea 100 miles, circle for 48 hours at 18 knots and return. He must steam 864 miles in circling. Entering from 19 knots on the *E* scale a vertical line cuts curve *B* at 1.85 miles per ton. Therefore, he will use $864 \div 1.85 = 467$ tons in circling. Suppose he has 550 tons on hand. He will have 83 tons available for the voyage out and back. Therefore, he must make 2.41 miles per ton going out and returning. Entering from 2.41 on the *B* scale a horizontal cuts the *B* curve at 16.5 knots which is the maximum speed he must maintain going out and returning.

The uses of the R. P. M. curve and coal-consumption curve proper are too familiar to require demonstration.

This curve sheet contains all the steaming data required for the solution of all problems in simple steaming, and can conveniently be put on a single sheet of 8″ x 10″ plotting paper convenient for a note-book, or for pasting on a board to be kept in the cabin. It is believed that this method of handling steaming data will be found very convenient and that solutions can be made more quickly, and with less liability to error than when using the usual method of referring to tables of data which have to be interpolated, and

figuring in hours and consumption per hour. Using the curve one actually sees the expected performance and gets better information than when figuring to obtain a single point.

ADDENDUM

At the suggestion of Commander Kalbfus of the Office of Gunnery Exercises and Engineering Performances, the following is added to the article as originally written:

Instead of drawing the single average curve, five curves may be drawn on the performance sheet. These are illustrated by the five light curves in Fig. 3. The central one of these curves (*A-3*) is drawn as the average performance. Two curves are drawn on each side of this curve, *A-1* being the best performance, and the one used by the Department as the standard, while *A-5* is the worst performance curve and is aptly called the "danger curve." The other two are drawn about midway between the middle and the outer curves. The average curve is of course drawn through the centers of the greatest number of spots.

From each one of these five curves a separate set of curves of cruising radius and miles per ton is drawn, as illustrated for a single curve in the original article; and to avoid complication the curves are put on three separate sheets. Fig. 4 represents the five curves of "miles per ton" corresponding to the five performance curves, *A-1*, *A-2*, etc. Fig. 5 represents the five corresponding curves of "cruising radius" using 1144 tons of coal, and Fig. 6 represents the five corresponding curves of "cruising radius" using 950 tons of coal.

Having the five sets of curves the commanding officer, instead of depending on the average curves can select the curves which coincide with present conditions of steaming, as found by the latest performance of his vessel.

The uses of the curves are exactly the same as illustrated in the original article, except that here the commanding officer selects a set of curves which more closely agrees with his present steaming capacity as influenced by bottom, coal, draft, etc., or, on applying his data for the first day's steaming, selects for use the curves on which these data fall, or interpolate between the two sets of curves between which they fall. The five sets of curves will of course cover all conditions.

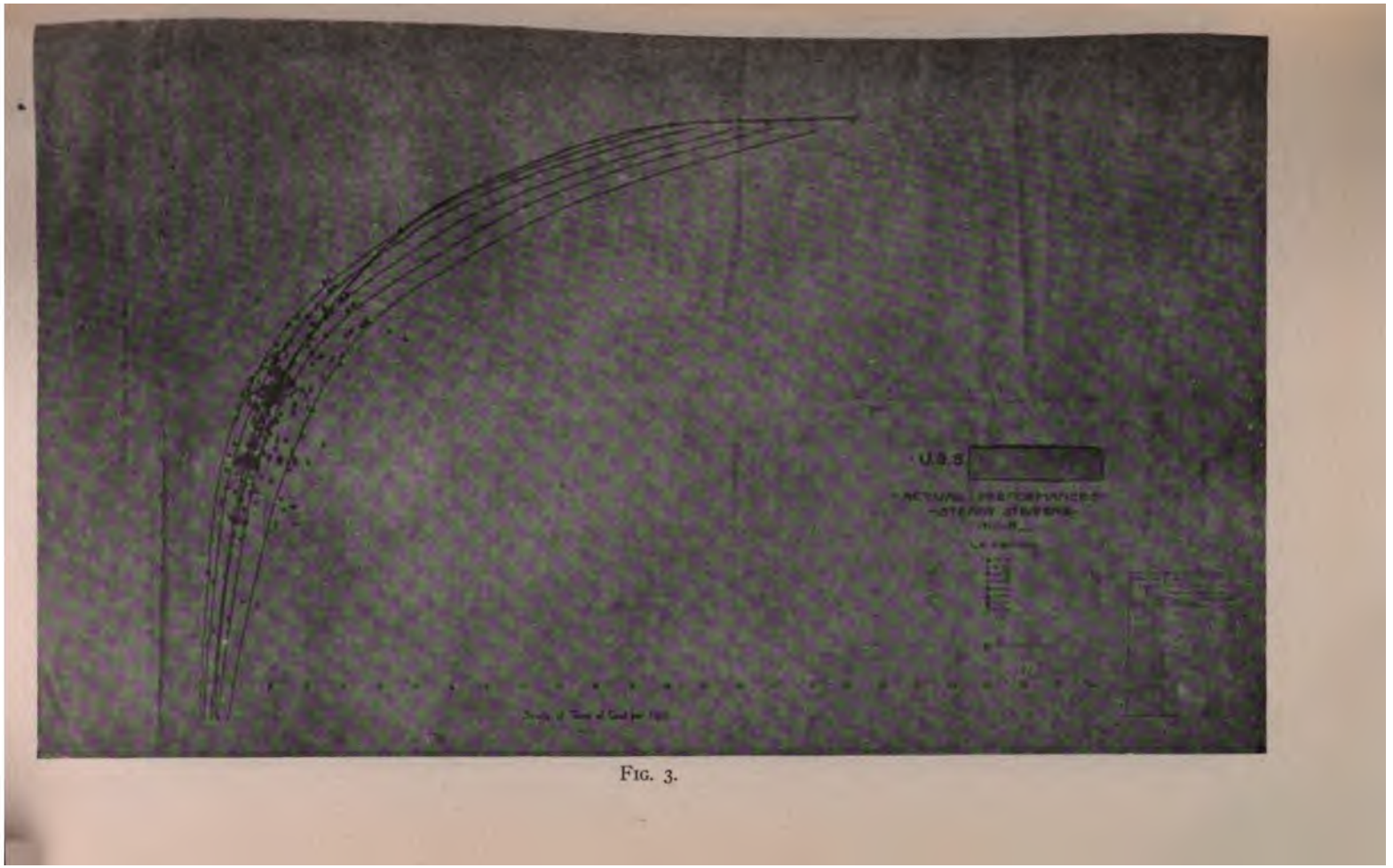
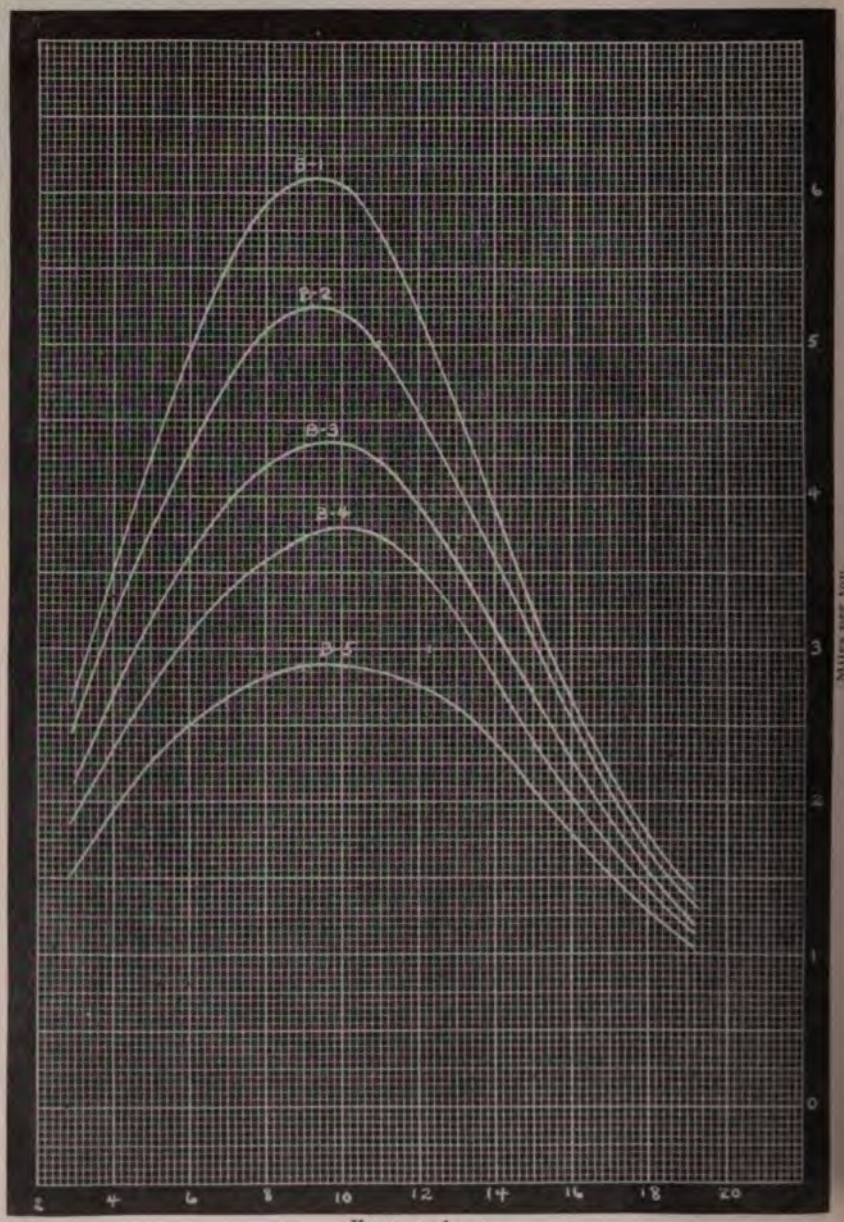


FIG. 3.



Knots per hour.

FIG. 4.

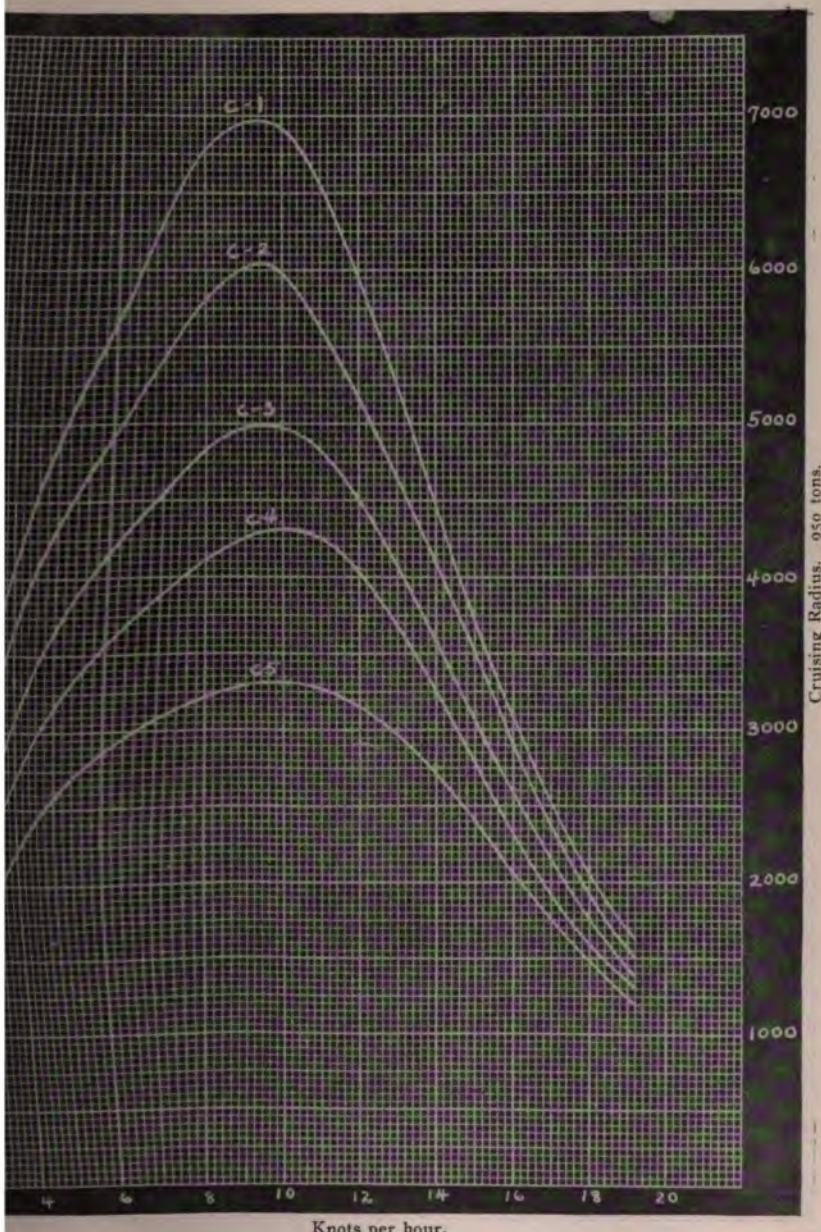
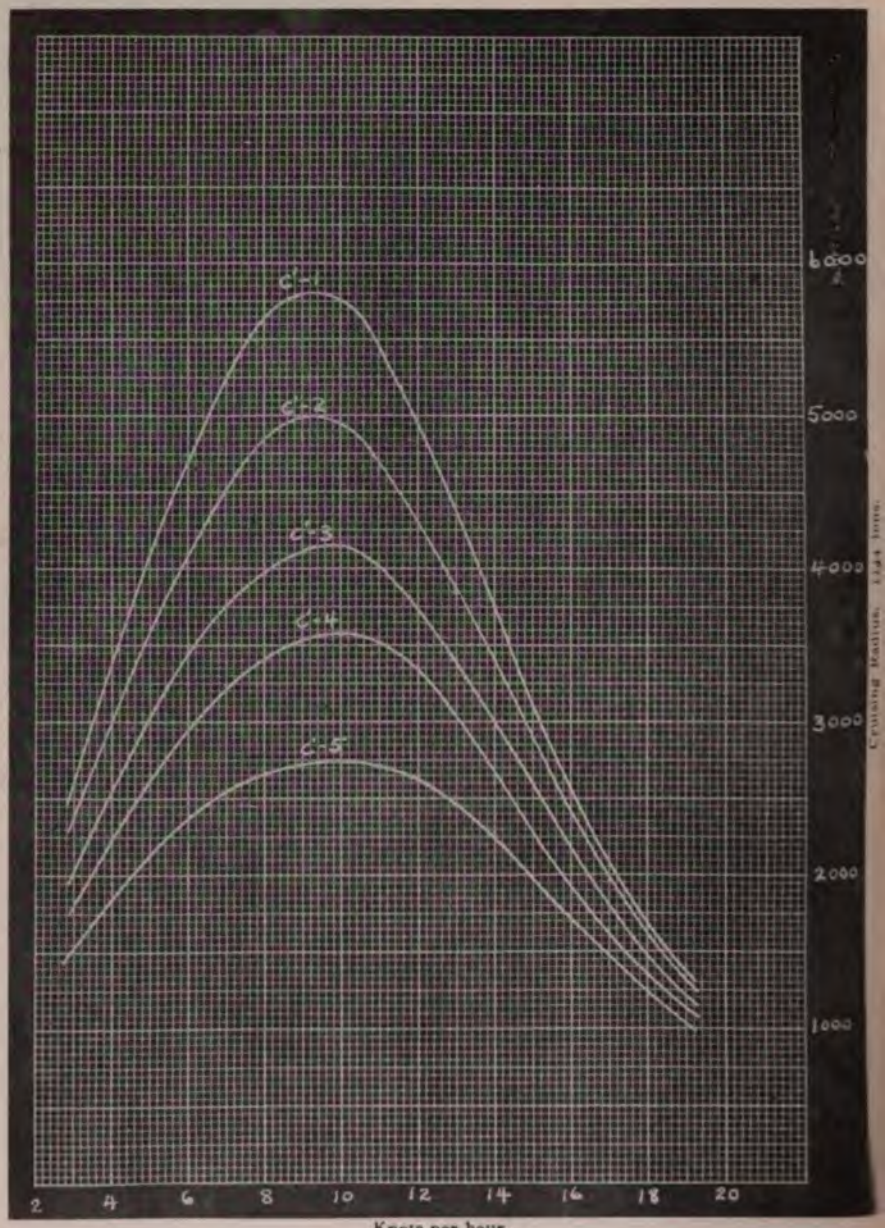

C 1
C 2
C 3
C 4
C 5
7000
6000
5000
4000
3000
2000
1000
Cruising Radius. 950 tons.
4
6
8
10
12
14
16
18
20
Knots per hour.

FIG. 5.



Knots per hour.

FIG. 6.

To illustrate: In the first problem, where the vessel has to make a voyage of 1650 miles on 500 tons of coal (or 3.3 miles per ton of coal), the commanding officer would be justified in selecting the curve of " miles per ton " corresponding to the latest performance of the vessel. Suppose during the last trip the vessel, steaming at 13 knots, made 4.1 miles per ton. The commanding officer, before sailing, would enter the " miles per ton " curve, Fig. 4, from 13 knots on the " knots per hour " scale, a vertical from which intersects a horizontal from 4.1 on the " miles per ton " scale on curve *B-2*. Therefore curve *B-2* would be used. So entering from 3.3 on the " miles per ton " scale a horizontal cuts curve *B-2* at 14.6 knots and at 4.2 knots, between which speeds he can make the trip without using more than 500 tons of coal.

Suppose he chooses 14 knots and after a day's steaming finds that he has made 3.5 miles per ton. Entering from 14 on the " knots per hour " scale, a vertical intersects a horizontal from 3.5 on the " miles per ton " scale just below the curve *B-2*, so he can predict his future steaming performance as lying along an imaginary curve just below *B-2*.

In the second illustration he has a voyage of 2000 miles to make without drawing on his reserve. Suppose that, as before, his most recent performance falls on curve *B-2*. He would in this case use curve *C-2* which corresponds to *B-2*, *C'-2*, etc. Entering from 2000 on the " cruising radius " scale a horizontal cuts curve *C'-2* at 17 knots which is the maximum speed he may use. After the first day's steaming he can recalculate, and should his data fall off curve *C'-2* he can use the curve on which it falls or interpolate between the two curves between which it falls. The other illustrations, and various problems that arise, can be handled in the same manner.

The original curve sheet was made for practical use aboard ship and with no idea of publication. It was found to be very desirable for use by the commanding officer, and the original description was accordingly written. Commander Kalbfus in reviewing the article suggested that it be expanded along the lines indicated. It is believed that a use of the curves in either the simple form of the average performance, or as expanded into five separate standards, will be found very useful and convenient.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Prize Essays 1918

The Board of Control announces the following awards in the Prize Essay Contest 1918:

Prize Essay awarded to Lieutenant Holloway H. Frost, U. S. Navy. Subject, "Letters on Naval Tactics." Motto: "Indoctrination makes effective coordination possible. Effective coordination makes concentration possible. Effective concentration, combined with the spirit of the offensive, makes victory probable." VOGELGESANG.

First Honorable Mention awarded to Commander H. O. Rittenhouse, U. S. Navy, Retired. Subject, "The Preparedness of the Future." Motto: "When a strong man armed keepeth his palace, his goods are in peace."

Second Honorable Mention awarded to Rear Admiral Bradley A. Fiske, U. S. Navy. Subject, "Naval Strategy." Motto: "First estimate the situation: then decide: then act."

The Prize Essay will be published in the April number of the PROCEEDINGS, if returned in time by the censor.

Articles for Publication

It is requested that all members take a more active interest in the writing and submitting of articles for publication in the PROCEEDINGS in order that the monthly publication may be continued and the usual standard maintained.

Dues

It is requested that members who have not paid their 1918 dues of $2.50, do so at their earliest convenience.

Address of Members

Because of the fact that many copies of the PROCEEDINGS are being returned by the Postal Authorities, *all members are urged to keep the Secretary and Treasurer informed of the address to which* PROCEEDINGS *are to be sent, and thus insure their receipt.*

This precaution is now of particular importance as notices of changes of stations are not now available for the use of the Institute's staff.

Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 10th of each month.

Membership Since December, 175 regular members have joined the Institute.

Deaths:

Captain Daniel Delehanty, U. S. N.
Captain R. K. Crank, U. S. N.
Lieutenant (J. G.) S. F. Kalk, U. S. N.
Ensign E. D. Peck, U. S. N.

Resignations: One.

Book Announcements Attention is invited to the List of Book Publications for a complete catalogue of books revised and republished by the INSTITUTE.

The Landing Force Manual, U. S. Navy, 1917, is being compiled by a board of officers and will be ready for distribution shortly after the compilation has been completed, probably April 15, 1918.

The Manual of Wireless Telegraphy has been revised and is ready for distribution under the title "Robison's Manual of Radio Telegraphy and Telephony."

Navigation and Compass Deviations, by Lieut. Commander W. C. Muir has been revised and is ready for distribution.

Discount on Books The five per cent additional discount allowed to purchasers of books whose accounts during a calendar month amounted to a hundred dollars or over has been discontinued.

Book Department The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

Suggestions Invited

Comment and suggestions relative to the make-up of the PROCEEDINGS are invited from all members interested in the welfare of the Institute. It is believed that the scope of usefulness of the PROCEEDINGS to members can be increased and all members are invited to assist in this work. Should any topic, on which you think an article could well be written, occur to you, send it to the Secretary and Treasurer, together with such explanation or comment as may appear desirable in order that the intent of the suggestion may be clearly understood.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations

Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Notice

Whole Nos. 145, 146, 147, 149, 155 and 166 of the PROCEEDINGS (March, 1913, June, 1913, September, 1913, January-February, 1914, January-February, 1915, and November-December, 1916) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

ANNAPOLIS, MD., February 22, 1918.

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PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT W. B. JUPP, U. S. Navy

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BRAZIL

U. S. NAVY TEACHERS FOR BRAZILIAN NAVY.—Secretary Daniels announces that a commission of American naval officers will go to Brazil as instructors in the Brazilian school for naval cadets.

In sending these officers the United States is carrying out a recent promise to Brazil to assist in that country's war preparations.—*Official Bulletin*, 28/1.

BRAZIL WOULD AID AIR AND SEA FIGHT.—Commenting on notes exchanged between the Brazilian Foreign Minister, Nilo Pecanha, and the British Minister, Arthur Peel, on the subject of Brazil's naval contribution to the war, the *Jornal do Commercio* lays stress on the firm determination of Brazil to act, on the one hand, by means of aviators sent to England, and, on the other, by cruiser and destroyer squadrons.—*N. Y. Herald*, 31/1.

BRAZIL BUILDING AN ARMY.—Plans for the moblization of an army of defence to be composed of several hundred thousand men are being put into execution with almost feverish haste, but no announcement has been made that Brazil will send troops to Europe. It is generally believed that this fighting force is to remain in Brazil.

When Brazil declared a state of war to exist with the German Empire the Brazilian Army was composed of 18,000 men, with officers enough for 30,000. Plans were made immediately for increasing the standing army to 35,000 men by January 1, with the possibility of further increasing it to 100,000 within the year.

The mobilization plan provides for three lines of defence, the first eventually to comprise 100,000 between 17 and 30. To assure this number, it is said in official circles that conscription will take the place of the voluntary system of enlistment, which has been in effect until now.

The second line is to consist of an army of 500,000 men between 30 and 37, with detachments in every city and town in the republic. These men are to be mobilized on a war footing, ready for service at short notice, though it is not believed that they will be kept under arms, the plan apparently being to organize them as a home guard and permit them to attend to their business affairs, devoting stated periods of time to drill.

In addition to these two armies there is to be a reserve army, to be known as the national guard, comprising men between 37 and 44. The officers of this force are to be chosen from government administrative officers, commercial men, and employers of industry.—*N. Y. Times*, 21/1.

FRANCE

FRANCE TO TAKE MERCHANT SHIPS.—*Requisition of Entire Fleet is Decreed as Effective on March 10.*—A decree published in the *Journal Officiel* provides for the requisitioning of the entire merchant marine of France on March 10.

Government commissioners will confer with the shipowners as to the conditions under which the government will take over the vessels.—*Washington Post*, 17/2.

GERMANY

SUBMARINE BUILDING.—To arrive at a fair or accurate estimate of the rate at which Germany can build submarines in the future is difficult. Assuming, however, that all yards in the country were utilized exclusively for this kind of work and that no mercantile shipbuilding or repairs to the battle fleet were undertaken, which, of course, is far from being the case, the probability is that not more than 100 submarines could be completed every six months.

Information at hand would indicate that the actual recent output has been approximately 10 per month, of which the great majority are in the neighborhood of 800 tons to 1000 tons displacement. Several groups of about 1500 tons have also been commissioned and quite recently the construction of a flotilla of eight so-called submarine cruisers of 2800 tons displacement has been undertaken, of which three or more are reported completed and the remainder will be ready for service by next February. These vessels will mount two 6-inch guns, besides two guns of lighter caliber, and embody the innovation of an armored conning-tower. This is more or less essential where the conning-tower constitutes the central control station of the vessel and at the same time is the most vulnerable part. It is only feasible, however, on vessels of great size, because of submerged stability considerations.—*Navy and Merchant Marine*, January

GERMANS TO BUILD 5000 PLANES.—Germany will have on the front some 5000 modern type war aeroplanes, with sufficient machines being constructed monthly by the various manufacturers to nearly replace those lost in battle and by accidents.

By offering special inducements to men entering the aviation service, great numbers of volunteer pilots, observers and bombarders have been secured, and are now under training in adequately equipped training camps.

It is realized by the allied aviators that 1918 will see stiffer fighting in the air than was deemed possible even a few months ago. The aerial forces of the United States cannot be whipped into shape too rapidly if they are to participate in the coming decisive struggles for the mastery of the skies.

The number of Prussian, Saxon, Bavarian and Wurtemburg escadrilles at present on a war footing and at the front is 270, classed as follows:

Bombardment escadrilles (Kampfstaffeln), 23; chasing escadrilles (Jagdstaffeln), 40; protection escadrilles (Schutzstaffeln), 30; campaign escadrilles (Fliegerabteilungen), 80; artillery observation escadrilles (Fliegerabteilungen A), 100.

The total number of aeroplanes represented by these 270 escadrilles is about 2500. The bombarding and chasing escadrilles are being increased

in number and strength rapidly, as the German aviation authorities consider them the most effective instruments of aerial warfare.

To the above formations must be added: The naval aviation groups, which include land escadrilles (Landfliegerabteilungen) and sea escadrilles, of an uncertain number; the fixed escadrilles (Kampfeinsitzerstaffeln), perhaps 10 in number, and some 12 depot escadrilles (Fliergerersatzabteilungen), which serve for the training of pilots and as a reserve for the escadrilles at the front.

The German aviation parks comprise:

With each army an army aviation park, including a depot for materials and machines; workshops and repair rooms and a reserve of personnel for the different escadrilles. In addition there are a certain number of special and emergency parks.—*Evening Star*, 30/1.

TORPEDO SHORTAGE RESTRICTS U-BOATS.—Shortage of torpedoes is one of the most serious facts with which the directors of the German U-boat war are now faced. It is a well known and admitted fact that German factories are at present absolutely unable to turn out first-class torpedoes in anywhere near sufficient quantities for the needs of the submarines. In fact, the underwater craft are being turned out faster than the torpedoes, with the result that recourse has been had to various expedients to keep the submarines supplied with their chief weapon.

Germany's fleet of U-boats must carry thousands of torpedoes. Thousands more must always be ready in reserve. In fact, the reserve supply should be larger to-day than a year ago, to allow for the more frequent calls made on it. The augmented destroyer patrol is responsible for this. They have made the submarines use up more torpedoes and have caused them to return to their base more frequently for reloading.

Eight may be said to be the average number of torpedoes carried in one submarine. The number ranges from four to twelve, according to the type of submarine. The *U-53*, which raided shipping off the Atlantic Coast of the United States, carried 10. More recent types load as many as 12. Mine layers can accommodate two, four, or six, depending on their size.

In connection with this shortage is the fact that all U-boat commanders now are strictly "rationed" as far as their supply of torpedoes is concerned, and are not permitted to waste torpedoes on long "chance shots" except in circumstances which they must explain in detail as justifying the expenditure of the underwater missiles.

Recently the German factories have been turning out a smaller torpedo which is less accurately tested but which may be used with a fair degree of certainty at close range. Of late very few German torpedoes have proved effective unless at fairly close range, and it has become unusual for a U-boat commander to make any attempt at a merchant ship unless he can get within 500 to 600 yards.

The Germans are now using two types of torpedoes. They may be described as short-charge and full-charge torpedoes. The short-charge is the one used mostly against merchant shipping and is fired at 500 to 600 yards. The full-charge, which has probably twice the destructive force and is better made, is reserved for men-of-war. It is fired at a great distance and is used less frequently than the cheaper torpedo.

But the comparative immunity of the American destroyers from torpedo attack—despite the loss of the *Jacob Jones* and the slight disablement of the *Cassin*—is noteworthy in this connection. The Germans hate the American destroyers as one of their worst enemies in their most fertile field of war action, and there is scarcely an American destroyer but has had one or more German torpedoes fired at her, yet only twice have the torpedoes found their mark.

The Americans and the British, with whom they are cooperating so successfully in this game of hunting "tin fish," attribute their immunity to the mobility of the destroyer. The alertness of the American naval men, coupled with their well-known keenness for offensive tactics against the submarine, have been responsible for their slight losses. Sharp lookouts

and skillful maneuvering enable them to cheat the Germans so often.—*N. Y. Herald*, 3/2.

EXPLOSION AT MUNITION FACTORIES.—Reports of explosions in Germany are becoming increasingly numerous, notwithstanding all the efforts of the German authorities to suppress them. A Karlsruhe telegram to the *Frankfurter Zeitung* states that a few days ago an explosion occurred at certain munition factories, presumably caused through improper manipulation of the ammunition. A fire followed the explosion, and three persons were killed and five injured. The damage, says the telegram, was relatively slight. Experience shows that these notices are never inserted in the German press unless absolutely necessary in order to reassure the public. Slight explosions are left unrecorded.

The Mannheim *Volksstimme* reported a serious explosion in munition factories at Kirchbaum, near Forbach, followed by an extensive fire, and the death or injury of many people. Apparently this explosion and fire are identical with those reported from Karlsruhe as very slight.

These repeated explosions are causing considerable anxiety in military quarters, not only because of the interference with the supply of munitions thereby occasioned, but also because of the spirit of unrest in the districts where they occur. This unrest has been acute since the advent of the frost, with the attendant suffering and the paralysis of potato transport.

The air raid reprisals undertaken by the Allies are, I have good reason to know, having a most salutary effect in awakening the population to a sense of the consequences produced by the Germans' ruthless air raid policy. Only by this means can the German home population be brought to realize their rulers' mistakes. Every Entente air raid is a most valuable educational influence in this direction. Great nervousness is felt throughout Germany, especially in the more exposed parts, by the intention of the Americans to invade Germany by air. This subject is universally discussed, though efforts are being made to calm the uneasiness by declarations about American bluff.—*London Times*, 31/12.

GREAT BRITAIN

THE FIRST SEA LORD.—By Arthur Pollen.—When I returned to England at the end of last week, after having spent nearly six months in the United States, I learned that Admiral Sir John Jellicoe had left the Admiralty to receive a peerage, and that Sir Rosslyn Wemyss had been appointed First Sea Lord. These events constitute what the *Daily Telegraph* quite accurately described as a "sensational" announcement. But judging from such public comments as I have had the opportunity of perusing, a great variety of sensations seems to have been excited. A good many people are plainly at a loss to understand the significance of what has occurred.

Sir Rosslyn Wemyss, save for his appointment as Second Sea Lord six months ago, and his more recent promotion to acting as Sir John Jellicoe's deputy, appears to be almost unknown to the press or to the general public. This may account for a certain lack of enthusiasm in the reception of the news of his promotion. Similarly the causes which made a drastic change in the higher command necessary, seem also to have been very little understood. One paper of very wide circulation, I noted, published a portrait of the outgoing First Sea Lord, and printed underneath it and in italics a statement to the effect that this particular journal had "never joined in the anti-Jellicoe campaign." When people see no reason why a change should be made, and then hear that an officer entirely unknown to them has been entrusted with the most difficult and the most arduous post in the anti-German Alliance, they are not unnaturally filled with misgivings and suspect that the late holder of the post is the victim either of some personal intrigue or of a cowardly submission to press clamor, and so look upon his successor as a *pis-aller*—a choice where there is no choice. The facts of the position are diametrically opposite to what such people suppose.

My readers may remember that some time before Mr. Balfour reconstituted his board, about 13 months ago, I pointed out in these columns that such a reconstitution was necessary, that the task of selection was extremely difficult, and that it was exceedingly unlikely, so obscure were the indications of competence in this grave matter—that Mr. Balfour could rest satisfied with his first, or even with second choice of advisers. I said this because the first choice was already known to him. To those who shared my doubts of a year ago, and have noted what has occurred between their expression and the present date, will have been more surprised that the second choice has been so long a-coming than that it has at last been made. It is unnecessary then to explain to them, as it would be ungracious now to explain to others, precisely why the first of the events of last week was inevitable. It is unfortunate that these transitions cannot occur without inflicting pain. The British public is extraordinarily loyal to its favorites, and particularly to its naval favorites. A large section of the public, which for years before the war had taken real trouble to study naval affairs, was led to believe that the greatness of the British Navy derived solely from the seamanship and statesmanship of Sir John Fisher, and depended on the leadership of his chief pupil and successor. It was shocked when events at Gallipoli led to Lord Fisher's retirement. It is shocked now when the gallant and popular officer, who had the full confidence of the nation in his command of the grand fleet, has to make way for another. This mental distress is deeply to be regretted, but it cannot be avoided. Old estimates of personal worth and ability formed in times of peace are constantly upset by the rude realities of war, without those who have formed those estimates being able to realize exactly how the upset has occurred. For the moment it is best to leave this mystery unexplained. It is more to the purpose to set out why the "second choice" is a sound choice. It may be some consolation to such people to know that the officer who is now First Sea Lord is where he is because it is war, and nothing else, that has shown him to be what he is.

If, therefore, I am asked what the recent changes in the Board of Admiralty signify, my simplest answer is, to say that at last we have an officer appointed First Sea Lord, not because of his seniority in the navy list, nor because he is blessed—or cursed—with a newspaper or popular reputation, but simply on merit shown in war. I was in Washington when Sir Edward Carson joined the War Cabinet, and an enterprising interviewer asked me why the Premier had put an ex-railway manager, presumably ignorant of the sea affair, at the head of the British Navy. I replied that he had done so for the almost incredible, but nevertheless valid reason, that Sir Eric Geddes had shown himself to be the right man for the place. Just as Mr. Lloyd George passed over all the popular politicians and chose the ablest man he knew for the most difficult position that a civilian can fill, so now Sir Eric himself has passed over all the advertised admirals and appointed the proved man for the most difficult post a naval officer can fill. It is natural to ask in what the proof consists.

In the early stages of the war the evidence of Sir Rosslyn Wemyss' merits must either have been slender or was unperceived, for when Sir Sackville Carden fell ill, a day or two before the last and most disastrous attempt to force the Dardanelles, Rear Admiral de Robeck was appointed to succeed him, and two officers senior to him were passed over by this preferment. Sir Rosslyn Wemyss was one of these. It is not an agreeable position for a rear admiral to find himself suddenly and unexpectedly subordinate to his junior. But it is in the day's work to accept these things with simple loyalty, and it would be no compliment to the present First Sea Lord to select that for congratulation which every naval officer must look upon as the most obvious and elementary of his duties. The fact is recalled to show that in March, 1915, Whitehall did not yet know their man, and likely enough because he had not yet been given his opportunity. But it was not long in coming now. It is known that on him devolved the chief share in the naval part of the two evacuations of the peninsular, and that

the naval part was the chief part. But his work at the bases previous to this and his subsequent work when he succeeded Sir John de Robeck in command of the Mediterranean, seem hardly to be known at all.

The abandonment of the Gallipoli adventure coincided, it may be remembered, with the beginning of the enemy's submarine activities on a large scale in the middle seas. The Mediterranean command was not limited to the Mediterranean, and it included the care of at least three lines of communications to different large army bases, and necessarily involved the closest co-operation with the French and Italian fleets. Few, if any, naval officers, therefore, have ever undertaken duties more difficult, more extensive and various, or more complicated than those which now fell upon the new C.-in-C. I see it has been stated, on the strength of his having commanded the vessel in which the King once visited his Eastern Dominions, that Sir Rosslyn Wemyss enjoys a reputation as a courtier. This is about as illuminating a remark as to say that because he wears a monocle he has a reputation as a dandy. But it is true that Admiral Wemyss is, in the best sense of that much hackneyed term, a man of the world. It was this fortunate circumstance combined with a perfect acquaintance with the French language that smoothed his diplomatic path with our gallant naval allies. He illustrated in short, but in an unexpected sense, the dictum of Nelson, that the best of all negotiators was a British admiral backed by a British fleet. The Paris Conference decided, I understand, and the decision was in every sense gratifying, that an Allied Naval Council was to be established. In acting with such a council Sir Rosslyn Wemyss has his Mediterranean experience to guide him. He has to welcome a new ally, the United States, as an addition to those with whom he has dealt before. It is surely a happy augury that these complex relations will be handled at the British end by one whose knowledge of the world, whose tact and diplomatic accomplishment are unquestionable.

However, the essence of the Chief Command to-day is to get, first, out of the British naval force and then out of our allies, the maximum dynamic effort against the enemy's effort to cut our sea communications. As most competent observers have long since realized, the defeat of the submarine is far less a matter either of new inventions or of mere multiplication of known weapons or weapon-bearing units than a matter of the best combination of forces already in existence. This combination can only result from a rightly organized staff. What ground is there for supposing that Sir Rosslyn Wemyss will do better than his predecessors in this matter? They are of the most solid possible description. They are, in point of fact, just these, that when faced with those extensive, varied, complicated and difficult tasks to which I have alluded above, Admiral Wemyss was able to deal with them, and deal with them successfully, precisely because, knowing exactly what he wished to do and being resolute to get it done, he also knew how to organize the men at his disposal, so that each separate task was clearly defined and plainly feasible. He profited, in other words, by the grinding experience of Gallipoli, and realized that only by a rightly constituted staff could the manifold work of war be properly done. The scale of this achievement was naturally enough known to few. But, by July of last year, the evidences of it were available at Whitehall, and Sir Eric Geddes had not long been there before he had appreciated their meaning. It will be remembered that it was almost his first act to bring Sir Rosslyn Wemyss into his councils. The change was announced in America in the second week in August. I may, perhaps, be pardoned for quoting from an interview with me in a Washington journal on the occasion.

"The really big stroke is the retirement of Sir Cecil Burney and his replacement by Rear Admiral Rosslyn Wemyss. I have not a British Navy list by me, but, at a rough guess, I should say there are probably 40 officers senior to Admiral Wemyss who have been passed over to permit this officer to take this position. Wemyss has long been regarded by the forward school as a 'white hope.' He was second in command during the Gallipoli

campaign, where his promptness, energy and fighting spirit showed him not only a real leader, but a man possessed of that cool, quick judgment which is of the essence of the matter in war.

"The cables say the new Second Sea Lord is to be relieved of certain departmental duties, but do not tell us what the new duties are to be . . . . But is it not difficult to guess the character of the change. The rearrangement of two months ago brought about an amalgamation between the War Staff and the Board of Admiralty. The First Sea Lord was still left as the chief administrative head of the whole active navy and of the staff as well. I expect what will happen is that the First Sea Lord's functions will now be cut in half, that he will remain the chief professional administrator and the Second Sea Lord will become the chief of the War Staff. It will represent the triumph of the younger school. When the great changes took place in May, those of us who had fought so hard for them for so long approved everything that had been done, but complained that the thing had stopped too soon. We also saw that the thing could not remain stopped where it was. It had to be pushed to its logical conclusion. . . . . It looks as if Sir Eric Geddes had found an extremely ingenious and perfectly effective way out of the difficulty. If the appointment of Admiral Wemyss means what I hope it means, we may expect to see the vast potential power of the British Navy applied to winning the war in a fashion which has not yet been applied."

It looks as if I did not very greatly misjudge the situation in August. What would seem to have happened is something like this. Sir Rosslyn Wemyss was tried at the Admiralty in the task of which he had shown himself to be a master in the Mediterranean. It was a task that had not been successfully met elsewhere, because it had never been attempted elsewhere. If he made good with the same success at Whitehall there would be no need for a deputy First Sea Lord, but a clear case for making him First Sea Lord. In the event Admiral Wemyss did make good.

Significance of Sea Power.—Surely the New Year could hardly open under happier auspices. The developments of the last few months have changed the position on land to the enemy's advantage in a most disconcerting and discouraging way. But as no one knows better than the enemy himself, it is at sea, and not on land that the war will finally be decided. The factors, that is to say, on which victory depends, are still those that derive from sea power. How well the enemy understood this a year ago was proved by his being compelled to drive the United States into belligerency rather than forego his only possible stroke at the sea supplies that kept the military alliance against him in munitions and stores, and the civil populations, on whose well being and contentment all military force is founded, supplied with the necessaries of living and prosperity. A year ago, when the enemy's efforts to make peace after his many defeats on the Somme had failed, when President Wilson's last effort at an amicable arrangement had shown all the world that no settlement by negotiations was possible, it became at once clear that a ruthless submarine attack on our supply ships would immediately be made. Those who remembered the terms of the German surrender to America of the previous May expected nothing else. For, with curious and quite unnecessary candor, Berlin, for once, instead of making a promise and breaking it, entered into an undertaking that was purely provisional and warned the world that the objectionable sinkings would be resumed the moment it suited Germany's convenience or necessity. In other words, from the day when Von Tirpitz first threatened the world with the submarine, in December, 1914, until she drove America into war in February, 1917, Germany was never under the faintest illusion about the sea war being the real war.

It is a vital matter that civilians in all countries should bear this fundamental truth in mind, especially at the moment when the disappearance of Russia has altered the whole balance of power on land. For the disappearance of Russia and the change in the military situation that results, do not in the least degree affect the validity of the axiom on which our

enemy has acted consistently and from the first. For the military change amounts only to this, that until the American army redresses the balance on land, the allied forces are possibly insufficient to obtain a definite military victory. But, meanwhile, the enemy forces are still less able to obtain a decision in their favor. The change in balance, then, restores a situation gravely weighted against the Central Powers to equality only. And it is, at best, temporary.

The problem of the day, then, is civil endurance; how shall we hold out till the enemy force is spent? It is largely a matter of confidence—of the certainty of ultimate and complete success. This confidence—if I am right in saying that ultimate success turns on the sea war—should now be better founded than it has ever been, for the reason that never before have we had a better assurance that a sea power would be rightly used. The reform of the Admiralty, initiated by the criticisms of last April and May, begun by Mr. Lloyd George in the end of the latter month, and now completed by Sir Eric Geddes, should form the turning point in the war.—*Land & Water*, 3/1.

JAPAN

JAPAN RESPONSIBLE FOR KEEPING PEACE IN EAST.—"Japan holds herself responsible for the maintenance of peace in this part of the world, and consequently in the event of that peace being endangered to the inevitable detriment of our interests, the government of Japan will not hesitate a moment to take the proper measures."

Thus Count Terauchi, the Japanese premier, spoke at the opening of the diet in referring to the internal disorders in Russia spreading to the Russian possessions in eastern Asia. The premier declared that the situation in Russia was causing him the greatest measure of anxiety. "As the true friend of Russia," he said, "Japan earnestly hopes that country may successfully settle its difficulties without much further loss of time and establish a stable government."

Count Terauchi said also that Japan joined unreservedly with the allied powers in the determination not to sheathe the sword until an honorable peace is secured.—*N. Y. Herald*, 24/1.

SPAIN

STOPPAGE OF SPANISH SHIPS.—The holding up of the sailings of Spanish liners this week and the stoppage of export licenses covering shipments to Spain came not unexpectedly, because it had been suspected for a long time in well-informed shipping circles that cordial relations with the kingdom could not consistently be maintained in view of certain conditions of which no secret was made before America entered the war, but which have since assumed a different aspect in so far, at any rate, as the attitude of this country is concerned. To the credit of Spain, it is to be said that the personal efforts of King Alfonso on behalf of a multitude of war prisoners and families dispersed as a result of invasion by armed forces, have endeared him to hundreds of thousands of people throughout the civilized world. But in a constitutional monarchy, such as Spain is supposed to be, the acts of the sovereign, meritorious or otherwise, have but little bearing upon the external relations of the country, and the acts of Spanish statesmen during the war have been responsible for the suspicion with which Spain is now regarded by the Allies. This suspicion is based partly upon positive, and partly upon negative, evidence. The positive evidence against Spain is based upon the fact that the peninsular has been for some two years the headquarters of the German propaganda in Europe and that the tons of pamphlets which have been distributed throughout Latin-America for the purpose of extolling the acts of the Huns in war, were written and printed in Spain and shipped thenceforth. Furthermore, Spain has taken very little trouble to prevent imports certified for local consumption to leave the kingdom, and before the system of licenses was inaugurated in this country the crews of Spanish ships were in the habit of purchasing huge quantities of fittings and engineer stores which could have been used

for no other purpose than that of supplying submarines. The recent escape of a U-boat that was supposed to have been interned in a Spanish harbor is still too recent an episode to warrant repetition and there is in the possession of the Allies conclusive evidence that some of the Spanish ships regularly engaged in transatlantic service supplied U-boats in Spanish territorial waters.—*Shipping*, 2/2.

SPAIN PROTESTS SINKING.—*King Alfonso Presides Over Cabinet as Reparation for the "Giralda" is Asked of Germany.*—The cabinet met yesterday under the presidency of King Alfonso and decided to send a strong protest to Germany, demanding reparation to Spain for the sinking of the steamship *Giralda*. The note will not be sent through Prince von Ratibor, the German ambassador, but will be telegraphed to the Spanish ambassador in Berlin.

The Spanish steamer *Giralda* was sunk by a German submarine January 26 after the crew of the U-boat had pillaged the vessel. The crew of the *Giralda*, which measured 4400 tons was saved.—*Washington Evening Star*, 1/2.

UNITED STATES

KEEL IS LAID IN RECORD TIME FOR FIRST FORD PATROL BOAT.—Secretary Daniels announces that he has received a telegram from Henry Ford, of Detroit, stating that the keel for the first of the new type patrol boats to be built in the Ford plant was laid February 6, and the side frames are ready to go up. The Secretary authorizes the following statement regarding this new type:

"The contract for these boats was given on January 17, so the keel was laid in 20 days after the contract was made.

"Mr. Ford's letter offering to build naval vessels in his plant was dated December 22, 1917. In a few hours after it was received, December 24, a telegram was sent, asking Mr. Ford to come to Washington to discuss the matter. Mr. Ford and his staff arrived in Washington December 27 at 6 p. m. The next day was spent in consultation with Rear Admiral Taylor, Chief of the Bureau of Construction and Repair, Rear Admiral Griffin, Chief of the Bureau of Steam Engineering, and other officers of the two bureaus. The Ford party then went to Philadelphia and other localities to look at shipyards and plants. They returned to Washington on December 31 for further consultation, and were given the preliminary plans and specifications of the boats to be built.

"The party returned to Detroit, and on January 8 the Navy Department wrote Mr. Ford that it was ready to hear further from him. Four days later more complete plans were delivered to representatives of the Ford Company.

"Mr. Ford telegraphed his proposition to the Navy Department on January 15. On the 17th the department telegraphed the award to the Ford Company of the contract for building a large number of the boats.

"Preparations for construction were begun at once, Rear Admiral C. W. Dyson, representing the Bureau of Steam Engineering, and Naval Constructor Robert Stocker, representing the Bureau of Construction and Repair, going to Detroit to assist the builders in laying out their plans. On February 7 the keel of the first boat was laid.

"When it was decided to build this new type of patrol boat, which possesses many of the advantages of destroyers and is as large as those of the older type, the naval constructors and engineers worked day and night and Sunday to perfect the plans, and the design was perfected in 10 days. The work was done in the Division of Design, Bureau of Construction and Repair, under the direction of Naval Constructor Stocker, and in the Bureau of Steam Engineering under the direction of Rear Admiral Dyson. A model was made and tested in the testing basin at the Washington navy yard, and all the details were completed in record time.

"The Ford Company is pushing construction at a rate that bids fair to exceed all previous records in the building of steel naval vessels."—*Official Bulletin*, 9/2.

NAVY POWDER PLANT.—Plans have been completed by the Naval Bureau of Ordnance, under direction of Rear Admiral Ralph Earle, chief of that bureau, to increase the facilities of the smokeless powder factory at Indian Head, Md. It is estimated that the sum of $2,400,000 will be required for this purpose and Congress has been asked to appropriate that sum.

Under authority given by the President during the recess of Congress installation of additional facilities already is under way. The present capacity of the plant is 24,000 pounds of powder a day, which will be increased to 40,000 pounds by July 1 and 60,000 by November 1, with the hope of ultimate increase to 100,000 pounds.

The plant is in operation 24 hours a day and the annual aggregate output will be 18,000,000, which quantity was decided upon after conference between the naval authorities, the army officers, the war industries board and representatives of the French and British governments. The cost of production this year is less than ever before, due to improved methods and increased output per employé. The cost is about 40 cents per pound, or 13 cents less than the powder obtained under contract.—*Washington Post*, 17/2.

SHIPS BUILDING.—Nothing may be said at this time about the progress of construction of the powerful additions to our main fleet which were authorized before we entered the war. It includes five superdreadnoughts of 32,000 tons, mounting twelve 14-inch guns; four ships of 32,500 tons, carrying eight 16-inch, 45-caliber guns; and four superdreadnoughts the biggest yet planned for any navy, of over 40,000 tons, mounting twelve 16-inch, 50-caliber guns. In addition, the program includes six 35,000-ton, 35-knot battle-cruisers, and ten 7500-ton, 35-knot scouts.

We are much pleased to be able to state that the plans of the battle-cruisers have been recast so as to bring the whole of the boiler plant below the water-line. It has been found possible to do this, moreover, without adding to the length or displacement of the ships.

The expansion of the navy in general has been truly enormous. The total strength of the personnel, including the Marine Corps, on November 15, 1917, was 272,000 officers and men, and it is still growing. So far as material is concerned, the total number of vessels of all kinds has been trebled since the war began, the total number of ships now under construction being close upon 800, including every type from the submarine chaser to the superdreadnought. For the fuller details of the expansion of our navy reference is made to our liberty war number of December 1, 1917.—*Scientific American*, 5/1.

PLANS NEW BIG DRYDOCK.—*Present Naval Structure at Norfolk to be Finished in October.*—That the great drydock under construction at the Norfolk Navy Yard will be ready for occupancy before October, was the prediction to-day of Rear Admiral McLean, commandant of this naval district. The admiral also declared that plans are ready to begin work on an even larger one the moment the first is completed.

The admiral declared that the structural shops, depots, storehouses and other improvements would be completed ahead of schedules. The yard was being developed, he said, into the nation's greatest structural and industrial base, while Hampton Roads would be the navy's chief operating base. —*Washington Post*, 17/2.

INCREASE IN NUMBER OF ASSISTANT SECRETARIES OF THE NAVY.—Secretary Daniels and Assistant Secretary Roosevelt differ radically as to the need of two more assistant secretaries of the navy, as contemplated by proposed legislation, and members of the naval committees, as a result, are in a quandary as to what recommendations to make on the subject.

Mr. Daniels does not believe that additional assistant secretaries are necessary. When he was before the House Naval Committee, he explained that there is no limit on the power of the Secretary of the Navy to detail any officer, active or in the reserve, to any duty in Washington or at

any shore station. The greatly increased administrative labors have called for many more such details than would be required in ordinary times. Under the present laws, in the necessary absence of the secretary and assistant secretary, the chief of naval operations becomes acting secretary, so that on that score there is no necessity for an additional assistant.

He also stated that the administrative machine of the Navy Department is centralized and efficient, it has met the strain of war by natural and easy expanse, and, while such service as additional secretaries would relieve the secretary and assistant secretary of much arduous labor, he feels that the present system insures personal and centralized directions that might not be benefited by such division of responsibility as the creation of new offices might bring about.

A few days later, when Mr. Roosevelt appeared before the same committee, he argued with emphasis in favor of additional assistants, pointing out that one would be of value in connection with the bureau of supplies and accounts, another having to do with the personnel, and the first assistant secretary to be the "understudy" of the secretary. In this view, he was supported by Paymaster General Samuel McGowan.

Mr. Daniels also is opposed to a proposal, advanced at the Capitol, for the establishment of a new bureau in the Navy Department to look after target practice, the chief of the bureau, to be known as director of target practice, to have the rank of rear admiral. The secretary believes that the present organization is sufficient and efficient with the present office of director of target practice under the control of the chief of operations. —*Washington Post*, 17/2.

NEW POLICY FOR NAVY YARD ADMINISTRATION.—A new policy for separating the administration of navy yards from naval districts is announced by Secretary Daniels in orders directing changes in commanding personnel.

Rear Admiral Spencer S. Wood is designated to command the first naval district at Boston, relieving Captain William R. Rush, who remains as commandant of the Boston Navy Yard.

Rear Admiral John D. McDonald is assigned to command the New York navy yard, succeeding Rear Admiral Nathaniel R. Usher, who will continue as commandant of the third naval district at New York.

Rear Admiral James M. Helm is appointed commandant of the fourth naval district at Philadelphia, relieving Captain George Cooper, who will remain as chief of staff.

Rear Admiral Augustus F. Fechteler is ordered as commandant of the Norfolk navy yard, succeeding Rear Admiral Walter McLean, who will continue to command the fifth naval district at Norfolk.

"This division," said Secretary Daniels, "which is necessitated by the magnitude of the naval activities in the districts, has for its purpose the separation of the industrial feature of the district work, which will be handled by the navy yards, from the military and marine features, which will be administered by the district commanders."—*Washington Evening Star*, 1/2.

THE WAR CABINET.—Critics of the war activities of the United States in their anxiety to find grounds upon which to base complaints lose sight entirely of the fact that in everything this nation does there must be given full consideration at all times to the necessities and the plans of our allies. Inquirers ask impatiently, "Why is this done?" or "Why don't the War Department do this or that?" And without waiting for an answer or looking calmly into the facts they frequently make charges which might be serious if warranted. The fact that in the conduct of this great world war the United States is just one of a firm, one of the junior partners at the present time, when expenditures of men and munitions is considered, does not seem to have become impressed upon the minds of many American citizens. The acts of each of the partners, the allies, must of necessity be in accordance with some definite line of action, con-

structive or destructive, that has been determined upon as that which will draw nearer the day of victory.

It is not difficult to perceive that the most vital feature of these activities at present is the maintenance of the forces that are at the front, supplying them with food, clothing and munitions, and training troops to send to the front just as rapidly as they are ready to go into the field. Plans to accomplish each of these objects cannot be worked out by the United States alone and every movement that is made must be a part of the necessary plans for cooperation. The activities of the War and Navy Departments are controlled by this purpose. The results following this cooperation have led to some criticism, but it may be safely said that nothing has been neglected that the departments had it in their power to do. That the defeat of the shipping bill two years ago is largely responsible for the shortage of transport tonnage cannot be denied and that measure was defeated by a Congress made up to a large extent of men who in the present Congress furnish some of the most severe critics of the War and Navy Departments.

There is much in the proposed war cabinet bill that sounds like the Board of Strategy which was formed in 1898 and some of the men in Congress are discussing giving the proposed new body similar powers to those held by that historic board, which won the special attention of "Mr. Dooley." These solons lose sight of the fact that in 1898 the United States was engaged in a war in which it had no allies and it had no problem of supplying anything to any other nation. They forget that any plan must have the approval of a general conference of the heads of the allied nations. There is an inclination among the critics to lose sight of the fact that representatives of the United States have met the representatives of our allies in Paris and much of the future activity of the war has already been mapped out. Future plans will be further considered in Paris or in London or in Rome. And while we shall do our part in the planning, Washington, several thousands of miles away, must be to some extent the place for the reception of orders and distribution of contracts by which the plans can be carried to final success.—*Army and Navy Journal*, 26/1.

U. S. BATTLESHIPS.—[Extract from Assistant Secretary of the Navy's speech before Harvard students.] The British Navy has the same relative strength against the German as it had at the beginning of the war. Furthermore they have the active cooperation of French and American surface ships of heavy tonnage. We have, of course, many battleships on this coast that are little heard about.—*N. Y. Times*, 17/2.

COORDINATION IN SHIPPING ADOPTED.—Coordinated direction of naval and army shipping to an extent seemingly impossible a short month ago became a reality January 30. As a result the overseas transportation of troops, supplies and the like will be greatly expedited.

All this as a result of the success which has followed the creation within the Navy Department of the Naval Overseas Transportation Service, of which Commander Belknap is the director. The new service has demonstrated marked ability in getting its ships through the submarine danger zone, and as a result of this success its tonnage was practically doubled.

The War Department announced it would turn over to the Overseas Service upwards of 2,000,000 tons of shipping which heretofore has been operated exclusively under the direction of the Quartermaster's Department. Many of these vessels are manned by civilian crews and have been under civilian masters.

The Bureau of Navigation will henceforth supply crews from the Naval Reserve, and the command of these ships will go to naval men. To all intents and purposes the vessels will be naval craft, although still performing their work for the army. And the change will mean that their efficiency will be doubled right from the start.

It was because he knew that this change was impending that Secretary of War Baker was willing to let it be known to the Senate Military Affairs

Committee that the army in France was to be materially added to within a short time. With shipping coordinated and the army and navy cooperating through vessels manned by disciplined naval men, high efficiency in overseas transport is possible. Under the old rule, with alien crews and civilian commanders, this could not have been done.

The taking over of this great amount of shipping by the navy and the manning of ships with crews from the Naval Reserve forces is considered in shipping circles one of the greatest steps toward making the United States merchant marine the equal of any in the world after the war. It means the Americanizing of all United States shipping.

In the past all ships have been manned by crews made up of aliens as well as Americans, but to become a member of the Naval Reserve the first requisite is that a member must be a naturalized citizen of the United States.

It is pointed out by those in charge of the work of taking over this merchant fleet that the crews will be thoroughly trained and disciplined according to the high standards of the navy, and that when the war is over and the ships revert to their owners, they will be returned with a full complement of men who will be given their discharge from the Naval Reserve.

Further, it is planned by Rear Admiral Leigh Palmer, Chief of the Bureau of Navigation, that where ships in course of construction are turned over to the Navy Department for operation to organize the crew in advance and have the men thoroughly trained under their future officers and ready to man the vessel immediately upon it being placed in commission.—*Baltimore Star*, 30/1.

BIG BUILDING FOR NAVY.—The new structure to be built for the United States Navy Department on the Bush Terminal property in South Brooklyn will, it is said, be the largest business structure in the city of New York. It will be 700 by 1280 feet and eight stories in height. It will be of reinforced concrete and practically fireproof, and will cost $10,000,000. It will have a floor space of 7,168,000 square feet, or over 165 acres.

This building will be used for the storage of naval supplies and for the manufacturing, packing and shipping of goods for United States war vessels.—*Washington Evening Star*, 9/2.

NAVAL BASE AT CAPE MAY TO BE GREATLY EXTENDED.—The Hotel Cape May, which cost its builders $1,350,000 in 1909, and which is now practically owned by Nelson Z. Graves, of Philadelphia, and George E. Matthius, of Seymore, Conn., has been leased by the War Department for hospital purposes at an annual rental of $99,000. It has 600 rooms and is the handsomest hotel south of Atlantic City. The hotel is within two miles of the Henry Ford farm, on which is located the Wissahickon Barracks, where about 3000 Naval Reserve men are being trained, and within a mile of the Navy Department's aeronautic training station and the submarine protector base at Sewells Point.

General George W. Goethals has also ordered the State Road Commission to build a hard surface road from Keys Landing to Cape May, to have ready access to the War and Naval Department bases.

The Cape May barracks, which were built last summer, are now being doubled in capacity, so that by late spring there will be more than 10,000 men in training there.

Including the dredging of the entrance to the Cape May harbor, which embraces 500 acres, the government has expended already about $3,000,000 at Cape May, as it is the only landlocked harbor between Sandy Hook and Norfolk. The Surgeon General's Department has reported that the Cape May cantonment is one of the healthiest training places the government has established.—*Baltimore American*, 28/1.

FOR LARGE INCREASE IN NAVY.—*Plans for Extensive Enlargement of Existing Training Stations.*—In connection with Secretary Daniels' renewed recommendation for a large increase in both temporary and permanent enlisted personnel of the navy, it is stated that the department plans exten-

sive enlargement of several existing training stations. Plans already have been approved for enlarging the Pelham Bay, N. Y., and Norfolk, Va., stations. Five thousand men are now at Pelham Bay and 16,000 at Norfolk.

The navy has 95,000 men under instruction, and, with the recommended increase, will have men enough to supply crews not only for the entire naval construction program as now contemplated, but also for the hundreds of merchant ships which are to be placed under its supervision.—*Evening Star*, 1/2.

NAVAL CREWS FOR U. S. TRANSPORTS.—It is announced at Washington that an arrangement has been come to between the Navy Department and the Shipping Board whereby all vessels used for transporting men or supplies to the American forces in France will be under the command of naval officers, and have crews of naval reservists or regular enlisted men. Up to the present, only the troop transports have been manned on this system, the horse transport and supply ships chartered for the American forces being operated by the Quartermaster's Department of the War Department, which employed merchant crews. Owing to the shortage of men in the American mercantile marine, it was not always possible to obtain a full crew of competent hands for every chartered ship, and it sometimes happened that a fast steamer could not realize her normal speed while in the submarine area, owing to unskilful stoking. Moreover, there was a dearth of trained men for lookout duty in the war zone. The new arrangement is therefore expected to add very materially to the safety of the transports and supply ships on the Atlantic route, as all these vessels will be operated by officers and men with naval training and accustomed to the high service standard of efficiency and discipline. This step has been found practicable in consequence of the great expansion of the navy's personnel since the declaration of war, so many volunteers having enrolled that, after assigning full complements to all warships and auxiliaries, complete and building, there will be a large surplus available for duty in the transport service.—*The Engineer*, 18/1.

A compromise seems to have been reached between the Navy Department and the Shipping Board regarding the personnel of the new merchant marine that is coming into being. Unlike most compromises, the plan hit upon gives promise of accomplishment, to some degree; but, like all compromises, it fails of the object ultimately to be sought. Under the terms of announcement made on December 12 the Navy Department and the Shipping Board will exercise a joint jurisdiction as follows: "The bulk of vessels under the American flag, whether engaged in the transatlantic or elsewhere, so long as they retain their character as merchantmen, will continue to be manned by merchant sailors. Troopships and vessels carrying whole cargoes of munitions or supplies for the army and navy, however, for military reasons," will be manned by naval crews."—*Navy and Merchant Marine*, January.

NAVY PERSONNEL—A CAUTION.—In all plans for the irresistible extensions demanded in the commissioned and warranted personnel of the navy the conditions and the resultant reductions in the naval establishment that must be faced after peace is declared should be kept clearly in mind. When the navy was reorganized and slowly starved almost to death after the close of the Civil War gross injustices were inflicted on the regular officers and serious harm was done to the service simply because no forethought had been exhibited.

Although less than 60 volunteer officers were, as the result of examinations open to all these gallant men, taken over, this and the yearly demotions forced by Congress blocked promotions until despair settled on the service in all grades below commander. It was the rule, not the exception, in those sad days for graduates of Annapolis to be kept in the rank of ensign for 12 years or more and for lieutenants to be held kicking their heels

without any advancement for periods varying between 20 and 22 years. In the late 80's a lieutenant less than 40 years of age was a curiosity.

At the beginning of the "present emergency," as Congressional acts euphemize this state of war, a number of reserve officers were granted temporary commissions as lieutenant commanders and lieutenants, and this before their mettle could be tested. It is recognized that the sudden and tremendous extensions in the lists of officers had to be met, and, as a consequence, in the early days haste rather than complete wisdom settled the problem. Without attempting to abridge for one moment the value of the work already performed and promised by temporary officers, who in the main have responded to the "great call" from a sense of unquestionable patriotism, it is now time for prudence to enter. Various bills are before Congress and others must follow, but previous to their enactment such safeguards should be provided that the cruel experiences following the close of the Civil War, and for many succeeding years, shall not be repeated. —*N. Y. Herald*, 8/2.

RESERVE OFFICERS' CLASS.—Secretary of the Navy Daniels visited Annapolis for the purpose of addressing the members of the second reserve officers' class of the navy upon the occasion of their completion of their 15 weeks' intensive training in the more practical branches of the activities of a naval officer.

Requests for assignments to particular ships or particular types of duty have apparently carried little weight with the navy authorities. Eight of the men will be kept at the Academy as duty officers for the third class of reservists, members of which are to be sent to New London for a four or five months' course on submarines; 60 have been ordered to torpedo-boat destroyers, about half of whom will go across in the near future: 60 will go to cruisers, gunboats or transports, and 87 will go to the Atlantic fleet's various ships. The remaining 27 will be held at the Academy for the academic board's action on their work.

The work done by the young citizen officers has been highly satisfactory to the authorities. The average mark for the entire class for the three months' work was about 79.1 per cent.—*Baltimore American*, 29/1.

SENATOR TILLMAN WANTS 10,000 AVIATORS IN NAVY.—Senator Tillman, chairman of the Senate Naval Committee, to-day introduced a bill to increase the number of naval aviators from 350 to 10,000 and raise the enlisted personnel of the navy to 180,000.

The President would be authorized to appoint temporary officers not higher than the rank of lieutenant commander in the navy and major in the Marine Corps.—*N. Y. Herald*, 29/1.

ENROLLING UNDERGRADUATES IN THE NAVY.—Instructions have been issued by the Bureau of Navigation to the commandants of the several naval districts regarding the enrollment of undergraduate students of technical universities in the naval reserve force. In order to insure the future engineering men of the navy that bureau states that it desires the enrollment of such students in the reserve. Any undergraduate between 18 and 21 years of age, who is actually taking a technical course at a technical university and who is physically qualified, may be enrolled as a seaman, second class, in class four of the naval reserve force for general service. These students will not be called to active duty until they have graduated, except in case of great emergency, which emergency the bureau does not at present foresee. No promise of commission will be given these undergraduates; and when they are graduated and called to active service they will be examined and rerated according to their ability and the requirements of the service. While they are on the inactive list pursuing their studies they will be carried in the initial rating of seaman, second class. Enrolling and recruiting officers of the navy and naval reserve force have been instructed to get in touch with the technical universities.—*Army and Navy Register*, 9/2.

COAST GUARD PERSONNEL.—Temporary increased rank and pay for certain officers of the coast guard while operating as a part of the navy has been recommended by the Secretary of the Navy, and bills now are pending which contemplate such legislation.

It is proposed to put the coast guard officers on the same footing as officers of the navy. Most of those that would be benefited by the legislation now are on duty with the naval forces operating in foreign waters and they are performing hazardous duty of the same general nature as that performed by navy officers. It is believed that the coast guard officers not only are entitled to this recognition of their services, but also that the proposed legislation will facilitate command at sea, where there is bound to be contact between officers of the two services doing similar work.—*Washington Post*, 17/2.

TRAINING OF NAVAL RESERVISTS.—The next class of naval reservists to be trained at the officers' school at Annapolis will number 450, which is the limit of the accommodations there. The results of the previous training, when two classes have been graduated of about the same aggregate strength, have been most satisfactory. Reports received from Vice Admiral Sims are most complimentary in regard to the 50 men sent from the school trained for service with the destroyers. The candidates are confined to enlisted reservists, selected from the naval districts, and the competition is keen on account of the opportunities afforded for service and promotion. Many of the students are college men who entered the service for the war. Numerous inquiries have come in regard to the instruction from the *U. S. S. Harvard*, which is in the war zone and which is manned by a set of young students from the Cambridge University who belong to the same fraternity and who want to be kept together. The naval authorities, and particularly Rear Admiral L. C. Palmer, chief of the Bureau of Navigation, believe this, as that officer stated to the House Naval Committee recently, to be "a very bad idea," because it was not desirable to encourage this inclination for non-separation.—*Army and Navy Register*, 9/2.

BELIEVES 6,000,000 TONS OF SHIPPING "POSSIBLE."—Rear Admiral Frederick R. Harris, manager of the Emergency Fleet Corporation after Rear Admiral Capps left that office, told the Senate committee investigating the shipping situation he believes the estimate of 6,000,000 tons dead weight as the production for the year 1918, made by the shipping board, is "possible."

He qualified this statement by saying that it would be possible only under the most favorable conditions, in which the resources of the country were coordinated.

The estimate of only 3,000,000 tons given the committee by practical ship builders he declared to be "pessimistic."

In the end, he said, the success of the project depended upon labor, and every effort should be made to get and use all the available labor for shipbuilding and to educate the labor up to the understanding that it was as important to build ships as to fight in the trenches or on war vessels to win the war.

Admiral Harris refused to criticise the present organization of the Emergency Fleet Corporation and the shipping board, though urged to do so by members of the committee.

"I don't believe in criticism that is not constructive," he said.

As for his own experience with the organization, he frankly said he could not work with it when Chairman Hurley called upon his, Admiral Harris', subordinates to report in person to the chairman without notifying Admiral Harris of the fact. He explained he had been used to the military and naval way of having the subordinate officials responsible to the officer above them, and that officer to the man above him.

He said that Rear Admiral Bowles, Rear Admiral Rousseau and others, all subordinate to him, had been instructed to report to Chairman Hurley

every day about what had been done and that they, not Mr. Hurley, had informed him of these orders.

Admiral Harris said Charles Piez the present manager of the fleet corporation, and while Admiral Harris held that office a kind of executive head acting for Mr. Hurley, had explained that such a proceeding was the "difference between naval methods and business methods."

Admiral Harris said he understood when he became manager that Mr. Piez was his superior and that Mr. Hurley was superior to all. He said he had no fault to find with that and that he and Mr. Piez had gotten along well together.

He denied that he had attempted to make contracts involving $12,000,000 for housing facilities at the shipyards on his own authority, as was published at the time he left office. He said he was convinced of the need of such an expenditure, but that he had laid the matter before his superiors.

Admiral Harris defended the fabricated ships, saying he believed when once they had begun to be turned out they would expedite the maximum output of ships.—*Washington Evening Star*, 6/2.

BUILDING AND LAUNCHINGS.—From reports received by the Shipping Board it is revealed that 901,223 gross tons of merchant ships were built in United States shipyards during 1917, being nearly double the figure of 1916. No official figures of construction in other countries during last year have as yet been received, but it is believed that we led the world in the output of new tonnage. In this connection it is of interest to note that 41 freight steamers and tankers aggregating 327,152 tons dead weight, which were commandeered by the Shipping Board last October, are expected to be put in service during this month and February and that the shipyards are making far better progress on this work than had been anticipated. Some 18 of these vessels will be commissioned this month.—*Marine Journal*, 26/1.

AMERICA TO GET JAPANESE SHIPS FOR WAR SERVICE.—The Shipping Board and representatives of the Japanese Government have about closed an agreement by which the United States will exchange one ton of steel for every two tons of shipping delivered to it by the Japanese Government and it is expected that the details of the agreement will be perfected in the near future.

Now that the United States has been pledged openly by the Secretary of War to land 500,000 men in France by next spring, it is imperative that the cargo ships of the United States be increased as rapidly as possible and that all tonnage suitable for transatlantic traffic be put into that service immediately. The negotiations with the Japanese have been dragging for weeks.

It has been known in semi-official circles for several months that the United States intended to take a much more active part in the military operations in France than was generally supposed, and it was common knowledge that the available tonnage under the control of the Shipping Board was wholly inadequate to the task of transporting supplies for the troops that were to be sent abroad. In spite of these circumstances little progress has been made in acquiring neutral or friendly tonnage.—*Evening Star*, 8/2.

FOR CHARTER OF SWEDISH SHIPS.—*Preliminary Agreement Entered Into Between the United States and Sweden.*—A preliminary agreement has been reached between the United States and Sweden, according to official dispatches from London, providing for the charter of Swedish ships to the United States to be used principally in the South American trade.

Some of the ships of the Swedish fleet now in American waters will be allowed to sail with their cargoes while others, it is understood, will be unloaded and put in the service of the United States. Negotiations are proceeding in a satisfactory manner and a final agreement is looked for shortly.

It has been decided to grant Sweden the privilege of purchasing and transporting oil cake, phosphates, kerosene oil and certain other commodities, but the chief point in discussion, the shipment of cereals and other food stuffs, has not been definitely settled.—*Baltimore American*, 29/1.

WILL CHARTER DUTCH STEAMERS.—Charter to the United States Government of all Dutch steamers now being held in American ports has been decided upon by the Dutch Government in a provisional agreement just signed in London.

The agreement provides charter for one round trip for upward of 80 vessels now in American ports. The vessels are not to go into the war zones, but five of the steamers will carry material for Switzerland and two will take cargo for the Netherlands Overseas Trust.

It is part of the agreement that the ships shall carry 150,000 tons of food for the relief of the Belgians, and may be used for other voyages later in American coastwise trade or elsewhere, possibly to Java for sugar.—*Nautical Gazette*, 24/1.

LABOR FOR SHIPYARDS.—Seeing that the passage of the administration's bill is assured authorizing the Shipping Board to expend $50,000,000 from the funds at its command in providing housing accommodations for shipyard workers, the Emergency Fleet Corporation has now started a nation-wide campaign to enlist a voluntary reserve army of 250,000 mechanics to insure the success of its shipbuilding program. This recruiting drive is being especially directed at skilled and semi-skilled workmen in industries not essential to the carrying on of the war, and labor at present employed on government contracts is not to be interfered with. On account of the curtailment in building, which is expected to last for the period of the war, the building trade is relied upon to furnish a large percentage of the required labor reserve. The automobile industry is also counted upon to supply a very considerable proportion. It has been even calculated that one-third of the workmen now engaged in garages and automobile repair shops could be easily spared for work in the shipyards. The authorities intend to have each state furnish a certain quota of the reservists needed, with the understanding that men will be employed within their home state as far as possible. Nevertheless, volunteers for the new force will be expected to pledge themselves to proceed, if so directed, to any part of the country where a demand for their services exists. What will certainly help the carrying out of the plans adopted is the likelihood of men of draft age, enlisting in the reserve, being called upon for service in the shipyards rather than in our army and navy units. To be able to render just as important a service to the nation as the men who go to the front, without having to submit to the rigors of military discipline, will doubtless appeal to many of our better-trained mechanics.—*Nautical Gazette*, 24/1.

NAVIGATION SCHOOL RESUMES.—The navigation school the United States Shipping Board is conducting in the custom house at Baltimore to furnish junoir officers for the big fleet of American ships that will go into commission this year has resumed sessions under the direction of Professor Lindau. Two sessions of the school are held daily. Young men who complete the course will be placed on ships to gain experience that will enable them to pass their examinations before the board of steamboat inspectors for this district in order to be granted licenses to take officers' berths on American ships.—*Evening Star*, 21/1.

ENGINEERS TO STUDY IN FACTORIES.—Chief engineers training for service on cargo ships of the United States Shipping Board are to be sent to factories to follow the construction of the engines from the very beginning until their actual installation in the vessels to which the men will be assigned. The details of the plans are being worked out by the director of recruiting of the Shipping Board.—*Evening Star*, 21/1.

TRAINING TO DODGE U-BOATS.—*Twenty-Five Liner Captains Will Enter School Off New London.*—New London, Conn., January 21.—Twenty-five captains of ocean liners were due to arrive here to-day for intensive training in methods for avoiding U-boats. This training will be under direction of United States naval authorities. Three naval officers have been detailed as instructors, and the converted yacht *O-We-Ra* has been assigned as school ship.

Every captain has a rating that would enable him to take command of the largest of ocean-going liners. The course will last all this week in relays of three days' duration, two days of which will be occupied with lectures and the third day to actual practice in steering the yacht in a course designed to frustrate an attack by a submarine.

An American submarine will go out into the sound and maneuver, showing the periscope, and give the captains a chance to avoid an opportunity to torpedo the ship. The *Fulton* is to act as mother ship for the school.—*N. Y. Times*, 22/1.

RADIO MEN FOR MERCHANT SHIPS.—About 3000 men of the navy are in training at Cambridge, Mass., for duty as radio operators, with a view to meeting the demands for such men for naval vessels and for transports and cargo ships.

Correspondence has been exchanged between the Navy Department and the Shipping Board in regard to placing under naval control the radio men of the merchant service. This is considered necessary on those ships that have naval gun crews, and it is contemplated that the ships traversing the war zone have regular naval radio men. So far there has been little difficulty in obtaining men for this service.—*Washington Post*, 17/2.

TORPEDO PLANT BLAST NOT CAUSED BY ENEMY.—Enemy plotting was absolved of blame for the explosion in the Naval Torpedo Station at Newport, R. I., January 26, in a statement by Rear Admiral Earle, Chief of Ordnance, to-day.

"Every man in the drying room was killed," Rear Admiral Earle said, "so there is no reason to suspect the work of an enemy."

The dry house mentioned by Rear Admiral Earle was located in the former bombproof in which 25,000 detonators which were being dried exploded. The total weight of the amount of fulminate mercury destroyed was 125 pounds.

Sympathy to the families of the men "who lost their lives in the performance of their national duty" was extended by the Ordnance Bureau here to-day in a letter to the inspector of the torpedo station.—*Baltimore Evening Star*, 31/1.

OIL RESERVES FOR NAVY.—In the annual report of the Director of the Geological Survey, Department of the Interior, just made public, attention is called to the creation of two naval oil reserves in Colorado and Utah.

The survey has been investigating the oil shales of the United States that give the most promise of yielding a commercial supply of oil and has explored large areas in Colorado and Utah that contain immense deposits of such shales, some of which carry 30 to 50 gallons of oil to the ton. This potential resource is estimated by the survey in terms of billions of barrels of oil, which it is believed can be economically extracted from the shales, possibly in competition with petroleum at present prices.

The Colorado reserve created for the navy contains 45,440 acres, and the one in Utah 86,584 acres.—*Official Bulletin*, 28/12.

ORDERS TEN CONCRETE SHIPS.—Contracts for ten 3500-ton concrete ships were let to-day by the Shipping Board to the Ferror Concrete Shipbuilding Corporation of Redondo Beach, Cal. The first vessel is to be delivered within six months and the other nine within a year.

The building company will use a new plan of construction, recently patented, by which it can build the vessels more rapidly than under old methods of working concrete.—*N. Y. Times*, 3/2.

ASKS SYSTEMATIC SURVEY OF ENTIRE PACIFIC COAST.—Although it will take 20 years to complete the surveys of the entire Pacific coast proposed by the coast and geodetic survey in a bulletin issued, benefits would be available within a year after the work was begun, the survey says.

For 21 years no systematic survey of water areas adjacent to California, Oregon and Washington has been made, says the bulletin. The cost for a vessel to do the work and 20 years' operation is estimated at $2,300,000.

Not only consideration for lives and property, but the need of preparing for maritime expansion dictates the necessity for beginning the survey immediately, in the opinion of the survey. The bulletin concludes:

"The end of the present world conflict will see the merchant fleet which we are now building released from the restrictions imposed by our need for transatlantic transport, sailing the seven seas in a struggle to regain the pre-eminence which was ours in the old days of the clipper ships."—*Washington Evening Star*, 24/1.

FIRE KILLS TWO MEN ABOARD DESTROYER.—An oil fire in the engine room of a destroyer, resulting in the death of two water tenders, Martin O. Callaghan, of Columbus, Ohio, and Charles E. Bourke, of Worcester, Mass., was announced by the Navy Department. No details were published. published.

The department also announced that Hector N. Menard, seaman, of Bridgeport, Conn., had been killed by a heavy sea dashing over the transport *Hancock* during a recent storm.—*N. Y. Herald*, 24/1.

TELLS OF FINDING EMERY POWDER IN GYROSCOPE.—Emery powder was found in a bearing cup of a gyroscope ready for shipment to the United States Navy to be used in a torpedo, according to the testimony of Charles Teitelbaum, government inspector at the E. W. Bliss Company's plant, when the trial of Paul Hennig on a charge of treason was resumed before Judge Chatfield in United States Court, in Brooklyn, yesterday.

Under cross-examination by Arthur K. Wing, Teitelbaum said that following the discovery on November 12 last he had approached Hennig and asked the latter to disassemble that gyroscope and that Hennig had sent him to a workman. He admitted that 10 days before Hennig had brought back a bearing passed in inspection and had shown that it was soft.

Ensign Joseph A. Flynn, of the *Arkansas*, told of the workings of gyroscopes in torpedoes. The trial will be continued to-day.—*N. Y. Herald*, 30/1.

AMERICAN AIRMEN BOMBARD GERMANY; ALL RETURN SAFELY.—*Four Aviators Unable to Determine Extent of Damage They Did Owing to Heavy Fogs.*—With the American Army in France, Sunday (Delayed).—Four American aviators attached to a French squadron have participated in a daylight bombing raid over Germany. All returned safely.

Because the weather was foggy the aviators were unable to determine just what damage was done, but as they flew fairly low over the targets it is believed the results were good. After recrossing the lines the bombers were fired upon vigorously by enemy anti-aircraft guns. They then ran into still heavier fog, and some of the airmen were forced to land before reaching their hangars.—*N. Y. Herald*, 29/1.

MAY CALL FILIPINOS INTO SERVICE.—Authority to call into the United States service Philippine military organizations is given the President in a House bill passed yesterday by the Senate and sent to the White House.—*Evening Star*, 19/1.

TRAINING CAMP FOR PORTO RICANS.—Secretary Baker to-day announced the establishment of a second officers' training camp in Porto Rico, for 400 selected Porto Ricans. The camp will open February 1 and run three months.—*Evening Star*, 9/1.

TEACH WAR PHOTOGRAPHY.—*Columbia Announces the Opening of a New Department.*—Columbia University announced the organization of a School of Military Cinematography for the United States Government to train war photographers. The school, the only one in the country, will enroll 100 students and will be under military regulations. It is assumed that the students will be drafted men who have had experience in photography. A faculty of seven military men will give instruction.

The men will be quartered at the university, sentries will be posted and no student may leave the school without a military pass.—*N. Y. Times*, 9/1.

The United States Army in France will total 500,000 early this year. Pershing has taken over a section of the front in Lorraine, where the

THE REGION BELOW VERDUN IN WHICH EARLY ACTION MAY TAKE PLACE.

American troops have been engaged in the usual trench raids and have shown up well in the fighting. The artillery is reported to be doing excellent work.

MEXICAN SERVICE BADGE.—Officers and enlisted men who participated in the Vera Cruz expedition under the late General Funston, the punitive expedition into Mexico under General Pershing, or who have under certain conditions served on the Mexican border patrol will be eligible to wear a new service badge with ribbon, which has been authorized by the Secretary of War, with the approval of President Wilson. The following general order issued by the War Department states who will be permitted to wear the new badge:

"1. By authority of the President, a service badge with ribbon, to be known as the Mexican Service Badge, will be issued to all officers and enlisted men who are now, or may hereafter be, in the military service of the United States and whose service has been under the following conditions:

"(a) In Mexico, afloat or ashore, as members of the Vera Cruz expedition, between April 24, 1914, and November 26, 1914.

"(b) In Mexico as members of the punitive or other authorized expeditions between March 14, 1916, and February 7, 1917.

"(c) Those who were actually present and participated in an engagement against Mexicans between April 12, 1911, and February 7, 1917, in which there were casualties on the side of the United States troops.

"(d) Those who were present as members of the Mexican border patrol, between April 12, 1911, and February 7, 1917, in proximity to an engagement between Mexicans which resulted in casualties among their own company, troop, battery, or detachment.

"2. The distribution of this badge will be governed by the provisions of Article VIII, Compilation of General Orders, Circulars and Bulletins, War Department, 1881-1915. No individual will be entitled to more than one Mexican Service Badge.

"3. Persons not now in the Army of the United Sates, who, if they had remained in the service would be entitled to this badge, and whose separation from the service has been honorable, may apply to the Adjutant General of the Army for authority to purchase and wear the Mexican Service Badge."

The badge will be of bronze, one and one-fourth inches in diameter. On one side will be the Mexican yucca plant in flower, with mountains in the background as suggestive of Mexico. Above the yucca plant are the words "Mexican Service," in the upper half and the lower half "1911-1917" arranged in a circle. The reverse side is the same as the Indian war badge. The ribbon is of silk and shows these colors in the order named, green, yellow, blue, green.—*N. Y. Times*, 15/1.

AIRPLANE PRODUCTION.—Whatever may be the popular opinion of Fuel Administrator Garfield's order suspending business to relieve the coal situation, the wisdom of his rule exempting the airplane industry from the restrictions of his proclamation will be generally recognized. It would have been lamentable had the construction of aircraft been checked for a day, or even an hour.

We know now that we are not to have 100,000 planes in the air this year, nor anywhere near that number. In a recent statement Howard E. Coffin, Chairman of the Aircraft Production Board, exposed the futility of this hope, a hope based on the knowledge of America's industrial achievements of the past and the conviction that, in the building of weapons to strike Germany through the air, effort would be strained to the utmost.

The experience of our allies has shown that the maintenance of each machine at the front necessitates the employment of between 40 and 50 men in auxiliary branches of the service, or an army of more than 4,000,000 in the aviation service alone, were this hope to be realized.

But the shock to us of this enlightenment was probably no shock at all to those who have looked, and still look, to us for help in destroying, once and for all, Prussian militarism.—*N. Y. Times*, 20/1.

GENERAL STAFF REORGANIZATION.—The reorganization of the general staff, as announced in a bulletin from the War Department last week, was necessary, not only to meet the conditions of war, but also because the general staff had ceased to perform the functions originally intended to devolve upon it. It has departed so far from the object contemplated by Elihu Root, who was Secretary of War when it was created, as to have become a part of the executive machinery of the War Department.

In addition, it has intervened between the Secretary of War and the bureau, and has separated the experts of the staff corps in the War Department from the head of the department until the latter has come to depend almost entirely upon the chief of staff for his information of army conditions and needs. The result has been a Secretary of War that not always has possessed a knowledge of the military situation, save as it may have been imparted to him by general staff views or incorrectly obtained through an imperfect acquaintance of general staff members with the situation.

Further, the personnel of the general staff has changed to such an extent since commencement of the war, due to the natural desire of members to be

relieved for duty in the field and with the line, that the permanence of membership, at one time regarded as so essential to successful administration, has been lacking.

The introduction of the war council into the War Department machinery has been bewildering, and this is not lessened by any of the War Department bulletins that have sought to explain the relationship between the general staff and the war council.—*Washington Post*, 17/2.

ENLARGEMENT OF THE DRAFT AGE LIMITS IN FUTURE SELECTIVE SERVICE ACTS ARE DISCUSSED IN GENERAL CROWDER'S REPORT.—Discussing the enlargement of the age limits for selective military service, Provost Marshal General Crowder says in his report to the Secretary of War:

Should the class of draftable persons in future drafts be enlarged or diminished, as to the ages to be included?

A pronounced majority of the boards favor some enlargement, but there is great diversity of opinion as to the proper age limit. Nineteen and 35 are perhaps the limits most frequently suggested; but some recommend 40 or 45 years as the upper limit. There is a distinctly stronger demand for raising the maximum age than for lowering the minimum.

The reason given for advocating this enlargement is the fact that there are many good men under and over the present limits who could more easily be spared than an equal number within the limits.

The following additional suggestions are made by a number of boards: (1) That young men who are under age should come within the law when they reach the minimum draft age; (2) that young men of 18 or 19 should be enrolled and trained, so as to be ready for active service immediately upon attaining draft age.

It is obvious that we are at the threshold of this problem in our further provision for the conduct of the war, and that a wise foresight should be employed in settling it.

The two most important preliminary inquiries are: What are the numbers of available men in the additional age-groups? Which groups can we least afford to draw from?

Available Numbers by Groups.—The available numbers are as follows:

Male population available 1918:	
Males, 31-45 years, both inclusive (estimated)	10,683,249
Males, 21-30 years, both inclusive, not yet called	6,503,559
Males, 18-20 years, both inclusive (estimated)	3,087,063
Males arriving at age 21, between June, 1917, and June, 1918 (estimated)	1,000,000

Inasmuch as most (96 per cent) of the age 18-20 group are not married and most (77 per cent) of the age 31-45 are married, it will serve sufficiently the purpose to estimate the number of single persons available in each of these groups, and then to take the probable number of acceptances, as shown by the percentage of acceptances in the first draft. This estimate results as follows:

Probable acceptable men in age groups	Gross number	Probable acceptables Per cent	Net numbers
Single males 31-45 years (estimated)	3,525,472	39.41	1,389,388
Single males 21-30 years not yet called	3,354,086	39.41	1,321,845
Single males 18-20 years (estimated)	2,963,581	39.41	1,167,947
Single males arriving at age 21 (estimated)	960,000	39.41	378,336
Total	10,803,139	....	4,257,516

These figures show us the respective sizes of the available reservoirs to be drawn from.

In considering the grounds of preferences for the two groups not now liable to service, conflicting considerations meet us. The younger men are

generally deemed to make the soundest and most pliable military material. On the other hand, the older men are more likely to yield in large numbers the occupational skill so necessary in the varied composition of the modern army. Moreover, under the rational selective-service system, which seeks to distribute the burden equally among the willing and the unwilling, it is important, if not essential, to include the older men, because a smaller proportion of them are likely to enlist; *i. e.*, to enter the army voluntarily without waiting for the call of the law. If the age limits were not enlarged to include the older men for raising the needed numbers, too large a proportion of the younger and more aggressively patriotic men would be withdrawn from civil life, thus unduly injuring the coming generation.

In view, however, of the considerable number of men already available under the law, the main reason for enlarging the age limits at this time is to distribute the burden more equally, in preparation for a later situation of need that may arise. From this point of view, the extension might well be both upward and downward, by way of a registration of all ages 19 to 21 and 31 to 45.

In any event, the greatest caution should be exercised not to interfere with the technical training of the younger group of men. The higher training should be protected from undue inroads; for it is there that the practical sciences are being developed. Both war and industry must be able to count upon a continuous and ample supply of trained young men. The experience of continental countries here has its lessons for us. The technical courses should not be allowed to be gutted. Already, by volunteering alone, many or most colleges have lost (on the average) 50 per cent of their students. The number at stake is not large in respect of the mere man power of the army, but it is potent in its possibilities for service if properly trained.

A wise expedient would be (if the age limits are lowered to 18 or 19). (1) to require every technical student in a recognized college to enter the enlisted reserve corps, and to relieve him from call by a local board during the completion of his course; (2) to require every such student to take a course of military instruction and drill for each of such years, or to enter an officers' training camp during the summer; (3) to appropriate the sums necessary to provide military instruction and drill at every college furnishing a unit of 100 men. By this means, the vital demand for educated young men could be filled, and at the same time their preparation for military service when needed could be insured.—*Official Bulletin*, 25/1.

ORDNANCE AND GUNNERY

SUBSTITUTES WOOD FOR COTTON IN EXPLOSIVES.—A discovery which may revolutionize the munition industry in this country was announced recently, when it was declared that wood cellulose had been used successfully for the first time in the United States as a substitute for cotton in the manufacture of explosives. W. E. Byron Baker, a chemist, of Lockhaven, Pa., announced the discovery in a paper read at the third annual convention of the American Paper and Pulp Association at the Waldorf-Astoria.

The importance of the discovery can be realized by the fact that if German scientists had not made a similar discovery soon after the war began the German nation probably would be without means of producing explosives in necessary quantities, as cotton imports have been shut off from that country for nearly two years.—*N. Y. Herald*, 7/2.

A SHELL THAT WILL NOT RICOCHET.—The "non-ricochet" shell, a missile as deadly as the depth charge, is the newest device perfected by the navy ordnance experts for use against German submarines.

The new shell dives when it strikes the surface of the water instead of bounding, as do the ordinary missiles used in either naval or coast defence

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HEAVY ITALIAN GUNS BOMBARD ENEMY TRENCHES FROM MIDSTREAM IN LOWER PIAVE.

artillery. In addition, through the use of a new fuse the charge can be made to explode on contact with a solid surface under the water or at a predetermined depth.

The value of the latest anti-submarine weapon lies in the fact that shots which fall slightly short will be of as much effect as those which register direct hits. Pursuing its course beneath the water, the shell will explode against the side of the submerged submarine. Similarly, when these shells are aimed at a periscope of a submarine headed bow-on, there is a material increase in the chances that an overshot will take effect somewhere along the hull.

The Navy Department has forbidden the publication of details of the invention, but it is known that the British and French admiralties also have adopted it.—*N. Y. Times*, 23/1.

MINE SWEEPING DEVICE.—A mine sweeping device, calculated to pick up and safely bring to surface any mines that may be in the path of vessels is now being attached to a number of ships proceeding through the waters of the war zone. It is attached to the bows and when let down a netted projection extends a dozen or more feet on either side of the ship. If a mine is encountered it is picked up and brought to the surface at a safe distance from the vessel.—*Evening Capital*, 12/2.

NEW ARMY RIFLE.—Many favorable reports are being received with regard to the 1917 model United States shoulder rifle, which now is being produced at a greater rate than rifles ever were produced before in any country and in quantities sufficient for all troops that we may raise.

The rifle is modeled after the British Enfield, which used a rim cartridge of .302 caliber, but it represents many improvements over the British piece and is adapted to fire the caliber .30 rimless cartridge used in the Springfield rifle and in the machine guns used by the army, navy and marine corps.

Although those who have been instrumental in the design and the overcoming of the stupendous production problems incident to the turning out of the new rifles in quantities, are reluctant to speak of their accomplishments, they feel that they have done more than even they themselves expected, particularly in the rate of production that now has been reached.

Enough rifles are available for all troops in the service on duty that requires them. If there are any troops that have not been armed with the rifle, of either the Springfield or 1917 types, it is because of transportation difficulties, and not because the ordnance department has failed to have them ready in time. The new rifle will be ready in sufficient quantities for the men of the second draft by the time they require them.

Among other charges that have been made with respect to the new rifle is that the delays incident to the adoption of a new type have resulted in many troops being unarmed, it being stated that at some of the camps fully 50 per cent of the men had not received rifles. While it is not permitted to state exactly what proportion of troops are required to be armed with a shoulder rifle, although, of course, that is well known in the service, it should be remembered that every army has a large number of noncombatants who do not carry a rifle, and that many of the combatant classes are engaged in field artillery and other work in which they have no need for such a piece.

Considerable criticism also has been directed against the ordnance department because of its insistence that there should be a reasonable amount of standardization or interchangeability of parts of the rifle in order that replacements of those easily removed and apt to become injured or defective could be made readily. This policy was followed only to the extent absolutely necessary, that manufacture of the rifle might not be retarded any more than essential to the production of a proper arm.

As a matter of fact, there are only seven parts of the rifle, instead of 57 as has been charged, for which it is prescribed that there shall be no

departure under any circumstances from such perfection as would permit interchangeability, although the specifications set out other parts for which interchangeability is desirable. Of course, any one that has no acquaintance at all with a small arm knows that a bayonet, for example, should be capable of being placed on any rifle and should not be such that it can be used only on the one with which it is issued; and those that have handled a rifle at all know that the bolt of the breech mechanism and magazine, for example, should be capable of transfer from one rifle to another. As was anticipated by the ordnance experts, there is criticism now on the other side—that is, to the effect that interchangeability has not been carried far enough.

The favorable reports coming in from troops using the rifle confirm the ordnance experts in their belief that the United States in the 1917 piece has the best small arm in the world, with the exception, perhaps, of the Mauser type of rifles used by the Germans, and that our small arm is in every way equal to that of the Germans.

The policy has been adopted of placing a rifle expert of the commissioned ordnance personnel on duty at every camp to which the new rifle is sent, in order to aid troops in its use. Major Smith W. Brookhart, of the Ordnance Reserve Corps, who has been on such duty at Camp Dodge, Des Moines, Iowa, reports that unusually high scores have been made in practice with the piece.

In one colored regiment, for example, an average of 44 bull's-eyes out of a possible 50 was made at a range of 100 yards. This is thought to be due, among other things, to two factors: First, the placing of the rear sight on the bridge of the receiver, and thereby bringing it 10 inches nearer the eye than on the Springfield rifle, and increasing the sight radius or distance between the front and rear sights; and, second, the open peep-sight, whereby the soldier automatically centers his eye at the center of the rear sight.

While at Camp Dodge, Major Brookhart conducted instruction in the use of the new piece, which was attended by members of the personnel of all grades, from general officer to private.—*Washington Post*, 17/2.

OUR NEW 16-INCH NAVAL GUN.—Admiral Earle states that a 16-inch 50-caliber test gun is practically completed at the Washington Navy Yard, and that it will be proved within the next two months. Twelve of these powerful pieces will form the armament of our new 42,000-ton 23-knot battleships. He also says that the bureau has ascertained that the life of the large-caliber gun has been underestimated, the 14-inch 45-caliber gun having been fired a number of rounds far in excess of that heretofore considered to be practicable. We presume these good results are largely due to our most excellent powder, which, being a pure nitrocellulose powder, has much less erosive action than those containing more or less nitroglycerin. This is a most valuable quality, for it will mean that the new 16-inch 50-caliber gun above mentioned can be given a velocity considerably greater than would be possible with some other powders, such for instance, as the English cordite. We do not know, of course, what this velocity will be; but it is conceivable that (thanks to our powder), we may be able to maintain a muzzle velocity of 2800 feet per second, and still get a reasonable accuracy-life out of the gun.

Not many people outside of ordnance circles understand what an intimate relation there is between the powder and the gun—that is to say, how greatly the efficiency of any weapon is tied up with the all-round efficiency of the powder. Evidence of this is seen in the fact that the new British 18-inch naval gun is only 40 calibers in length and has a muzzle velocity of not much over 2300 feet per second. This means that the British 18-inch gun is probably not over 40 calibers in length, and that its muzzle velocity is about the same. If this be so, it is evident that the question of erosion, which has always been a most serious one where cordite is used, has very largely controlled the design of the gun. High muzzle velocities, other

things being equal, mean a high rate of erosion, and low velocities mean relatively light erosion; and if they are getting only about 2300 foot-seconds out of the new 18-inch gun it would indicate that the British powder still contains a certain percentage of nitroglycerin. Now if, as we hope, the Navy Department intends to secure 2800 foot-seconds with the new 50-caliber 16-inch piece, its shells, weighing probably about 2200 pounds, will have a penetrating power at all ranges at least equal to that of the English 18-inch piece, whose shells must weigh, surely, not less than 3000 pounds. The trajectory of our gun will be much flatter, and until the developments of the present war, this would have been considered a great advantage.

But due to the extreme ranges at which actions are now being fought, the angle of fall is so steep as to bring extreme-range attack within the category of "high-angle" or "plunging" fire, and, as we showed in an article in our issue of April 7, 1917, it is not so much the side as the deck of a ship that is vulnerable to such attack. The angle of fall of the lower-velocity shells of the 18-inch gun will, of course, be much steeper than that of the high velocity 16-inch shell of our guns. The danger space of our shells will be greater and more hits will be made; but the 18-inch shells that do hit will strike the lightly-armored deck rather than the heavily-armored side of the enemy—so there you are.

The range of our gun is probably greater, as is also the danger space; on the other hand, there is no question that a 3000-pound shell falling at an angle of say 25 to 28 degrees, if it hits, would endanger the flotation of a ship more than a 2200-pound shell striking at an angle of from 18 to 22 degrees, even though the latter carried a higher velocity.

This is an interesting question, and there is much to be said on both sides. Personally we prefer our battery of twelve 50-caliber 16-inch to one of eight 40-caliber 18-inch guns.—*Scientific American*, 19/1.

A FRENCH BIG BERTHA.—According to a correspondent of the *Washington Post* in France, the French have outbuilt the German big Bertha of 42 centimeters caliber, and their artillery now includes the 52-centimeter mortar. He states that the length of the new gun is such as to render this piece practically a howitzer. The same authority states that one of these pieces was used in the Verdun surprise attack of last August, and also in the Chemin-des-Dames attack in the neighborhood of Laon, where its huge projectiles wrecked the entrances to the quarries and prevented the men inside from reinforcing the first-line troops engaged with the enemy. Two shells from the "52" sufficed to wreck Fort Malmaison.—*Scientific American*, 9/2.

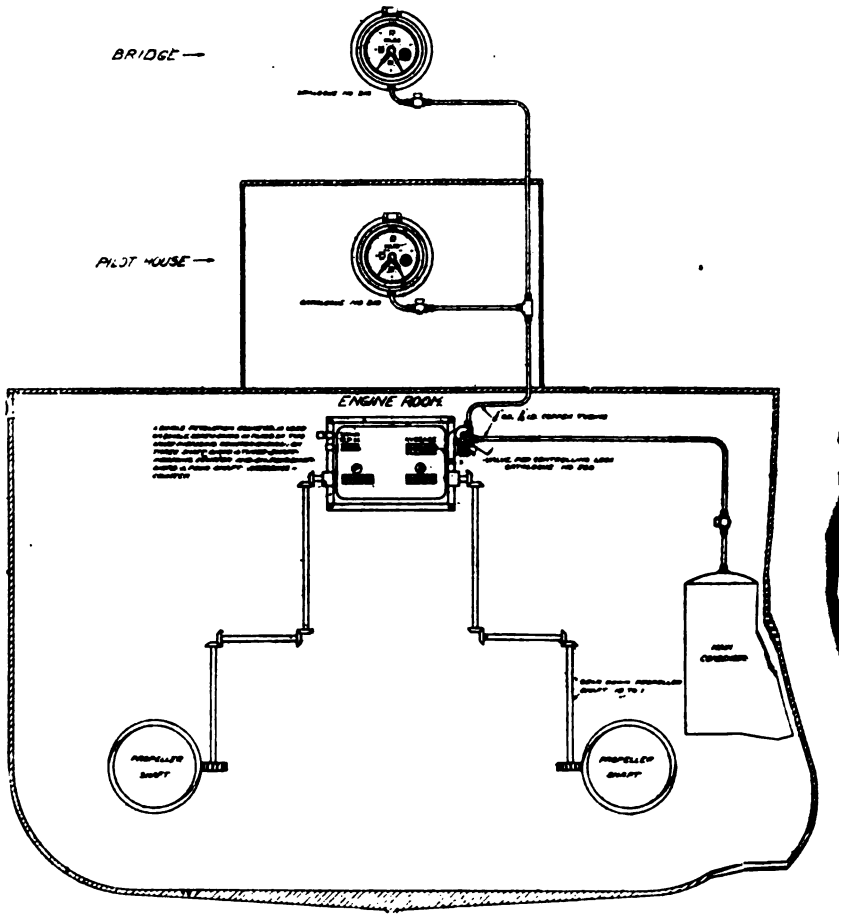
NAVIGATION AND RADIO

AN EFFICIENT INSTRUMENT.—The Cummings log for passenger, cargo and battleships, torpedo and patrol boats, and for submarines and yachts manufactured by the Cummings Ship Instrument Works, 110 High street, Boston, is illustrated on the opposite page. This instrument shows directly the total miles traveled by the ship. The "hundred miles" reading is given on the small dial at the left, the miles by the main hand on the large dial and tenths of miles on the small dial at the right. The log shown reads 58,266.5 miles. The course hand on the large dial indicates that the ship had traveled 41.2 miles since last set to zero. This hand, which is carried by friction on the shaft of the main hand, can be set back to zero at any time without altering the main reading.

On the bottom of the large dial are given the total average revolutions of the engines. The small dial at the top labeled Rev. per Knot is set to the number of revolutions of the propeller necessary to drive the ship one mile through the water. The removable key at the right is for altering this ratio as conditions change. A mere glance at the dial of a Cummings log enables the navigator to secure accurate results when running by dead

THE CUMMINGS LOG.

reckoning. This device is not a continuous moving indicator, but moves up in steps, and the two zeros shown on the dial should always be added to the reading when determining total average revolutions on a 50-cycle log. This instrument steps up the distance the ship is forced through the water by 50 revolutions of the propellers, thus the reckoning is not dis-



DIAGRAMMATIC INSTALLATION OF LOGS AND COUNTER ON TWO-SHAFT SHIP.

Note pneumatic connection from condenser to logs through control valve on counter, and geared connection from shafts to counter.

turbed when engines slow down or stop. The manufacturers have published a pamphlet which gives a complete technical description of this log, together with illustrations that they will gladly send to anyone interested.—*Marine Journal*, 2/2.

TIME ZONES AT SEA.—There are several matters of time reform in the air (or on the carpet, as the French say), one of which, at least, will probably be realized in the not distant future, for the scheme is already well advanced. This is a proposal to extend the hourly zone-time system, generally used on land, to the ocean, and the suggestion is that time should be kept according to this system both on the vessels of the navy and of the mercantile marine. The scheme originated with our French allies, who have decided to adopt it in their navy, and it has been discussed at an official conference in England by representatives of many important interests. The actual proceedings at this conference have not been made public yet, but there can be no impropriety in giving the substance of a note which appeared in the *Comptes Rendus* of the Paris Academy for July 23.

On board ship there are timekeepers of two kinds. There are chronometers for the purpose of navigation, which naturally show Greenwich time, and there are the clocks in use for the every-day life of the ship, which are set day by day, more or less at the discretion of the captain, but, speaking generally, show the local time of the place where the ship happens to be. It is this latter class of instruments to which the reform is to apply. It is proposed that the clocks on board ship shall always show a time which differs an integral number of hours from Greenwich time. The clocks need not be altered immediately on entering a new time-zone; but this will be left, as before, to be controlled by circumstances. These clocks, however, will always show the time of some hour-zone—preferably that in which the ship then is, and the number of the zone that the clock is then keeping is to be exhibited beside the clock; and in any entry of time made from the clock, in the ship's log or elsewhere, the number of the zone is to be entered. The numeration of the zones was discussed at the conference, and it has been decided that they should be $+1, +2, +3 \ldots$ West from Greenwich, $-1, -2, -3 \ldots$ Eastward. All this may seem rather unimportant, but the result of the change will be that Greenwich time can be deduced from the clock time quite easily; and it has been decided that in the case of wireless messages the time of sending shall always be given in Greenwich time, which illustrates the purpose of the new scheme.

The other reforms referred to above emanate from this. It is proposed in the first place that the astronomical day shall be made to agree with the civil day; or, in other words, that in the National Ephemerides the day shall begin at midnight, which is to be 0 hours, and the hours are to be numbered from 0 to 23. The alteration of the astronomical day is a very debatable matter, and the Astronomer Royal and Professor Turner are the joint signatories of a letter in the *Observatory Magazine* of this month, which asks for the opinion of astronomers on the point. More than 20 years ago this same question was under discussion, but nothing materialized. The cognate question of numbering the hours of the civil day from 0 to 23, which was also discussed at the earlier date, will probably again arise.—*Scientific American*, 5/1.

DAILY WIRELESS SERVICE BETWEEN ITALY AND U. S.—Direct radio communication between an Italian Government station in Rome and the Arlington station of the United States Navy here has been successfully established, and daily use is being made for communications passing between the two governments.

The daily statements of the Italian war office will be received by radio from Rome and issued here for publication in the United States.—*Evening Star*, 22/1.

U. S. RADIO STATION IN FRANCE.—The Navy Department is erecting a high-power radio station in France at a cost of $2,250,000, which will be ready for operation in August next. The French Government will take it

off our hands after the war is over. It will be used in connection with the great station fast nearing completion at Annapolis, which will be three times as powerful as the one at Arlington, Va. The present French stations are not powerful enough to get communication across the Atlantic Ocean, being of about the same power as the station at Arlington. All of the equipment and structural parts are being made in this country for the foreign station. A station is also being built in Porto Rico. The British are establishing a high-powered station in the Azores, which will be valuable as a relay station. At present about 30,000 words a day are possible by wireless, and the new station at Annapolis will add 50,000 words per day. The greater part of the communication at the present time is by cable. If the cables are cut, it is estimated that the Annapolis station and Sayville and Tuckerton would probably be able to take care of all absolutely necessary military business. There is but little necessity for the use of the Pacific coast stations at this time, as practically all of the naval operations are on the Atlantic coast.—*Army and Navy Journal*, 2/2.

ENGINEERING

LIBERTY MOTOR A BRILLIANT SUCCESS.—One of the latest and most insidious efforts of enemy propaganda to spread discouragement among the civilian population back of the fighting lines is seen in the presistent rumor that the Liberty motor is a failure, and that the output of airplanes is small and far behind the promised program.

We are in a position to state that not only is each of these statements a deliberate falsehood, but that the motor has exceeded the most optimistic forecast of its performance, both as to horsepower delivered and durability, and that the output of planes is keeping pace with the construction of motors. Both motors and planes are being built at a pace which ensures delivery in 1918 at the rate proposed when the appropriation of $640,000,000 was authorized for their construction.

The work of translating this vast sum, with the greatest possible speed, into a fleet of airplanes and enlisting and training the personnel, so that we may be prepared to launch a great aerial offensive against the enemy in the summer of 1918, is in the hands of the Aircraft Production Board under the chairmanship of Mr. Coffin, and the Signal Service Corps of the army under Brigadier General Squire. The enterprise has been greatly favored by the fact that, in the matter of organization, and in the personality of these two men, it is singularly free from that red tape and professional inertia which has proved so disastrous in some features of our military preparation. The public will be gratified to know that the whole of this vast work, entailing expenditures at the rate of $50,000,000 a month, is swinging along harmoniously and swiftly to its completion at the date assigned.

We have already emphasized the fact that, although the motor is American in type and design, it embodies the best of the accumulated experience of the British, French and Italian aeronautical experts. Our engineers had before them even the designs of the very latest German motors; something that was made possible by captures of enemy machines on the western front. For these reasons it is not surprising that we should have produced a motor which is a distinct advance upon anything as yet turned out on either side of the fighting front.

Since "time is the very essence of this contract," it was obviously desirable to design a standardized motor, which would lend itself to that quantity production which has made possible the enormous output of American factories, and particularly of those devoted to the automobile industry. And in spite of the widespread belief that the building of motors for military airplanes could be done only in such highly specialized individual plants as are found in Europe, the tests (severe and prolonged) to which

the Liberty motor has been subjected prove that an equally fine product can be made by our quantity-production methods.

It has been urged that, in view of the rapid improvement in military aircraft, it was inexpedient to tie ourselves up to a single type which, however good at the date of its design, might be outbuilt by the time our new fleet was completed. In answer to this it should be noted that the Liberty motor is to-day well in advance of current practice. Thus, the celebrated Rolls-Royce (according to Major Vincent), which weighs 950 pounds "has never authentically developed more than 360 horsepower"; whereas the Liberty motor develops more than 400 horsepower at 1625 revolutions, on a total weight of only 800 pounds.

In view of these facts, coupled with the severe tests to which it has been put, it is not surprising to learn that the allied governments have placed large orders in this country for the new motor.

Not only is the motor "ahead of the game" in respect of its output per weight and total output, but, at a recent meeting of the Society of Automotive Engineers, it was stated by Charles M. Manly, vice-president of the society, that "the men who are in charge of the government's aircraft program have made every possible provision for the improvement of the design with the least possible interference with production." In other words, it will be possible to introduce new features or improvements on later lot orders, "so that the government will never be tied up with a lot of obsolescent machines in process of manufacture."

Mr. Vincent states that the new motor is to be used on the machines of every type—speed scouts, battleplanes, observation and bombing machines and seaplanes: though these now being built are intended for heavy battle and bombing planes. There are two varieties: one for use at very high altitudes, another for seaplanes operating near sea level.

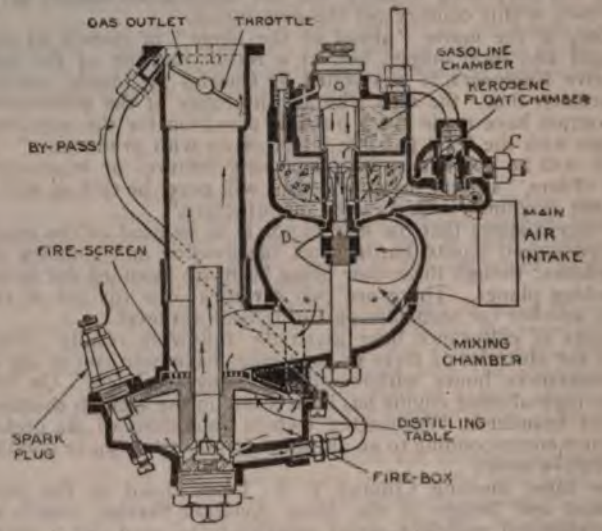
The tests of endurance have given the following results: The engine designed for altitudes of three or four miles have been run at sea level for eight consecutive hours without showing any weakness. On the other hand, the high-altitude engine has been tested in the vacuum chamber of the Bureau of Standards, Washington (where conditions of air pressure and temperature corresponding to an altitude of 35,000 feet can be obtained), for 50 consecutive hours.

At the same meeting Colonel V. F. Clark, head of the Section of Experiment and Design of the Army Aviation Service, asserted that if America obtained sufficient aerial superiority to send out a fleet of 500 bombing machines to destroy German lines of communication, there would not be much left of the war.

Undoubtedly; and when the full measure of our manufacturing capacity comes to be applied—as it ultimately will—we shall be in a position to send over the enemy terrain not one, but many raiding fleets of 500 machines each.—*Scientific American*, 26/1.

CARBURETOR WITH SPARK PLUG; A NEW DEVELOPMENT FOR VAPORIZING KEROSENE.—Mention has previously been made in these columns of the kerosene carburetors which operate on a partial combustion principle in which a portion of the liquid was burned to make a gas of the remainder of the vapor passing through the mixing chamber. In view of the interest prevailing at the present time in the action of various devices intended to burn kerosene, and inasmuch as there is apt to be shortage of gasoline as the result of the abnormal demands of war time conditions, particular interest is evidenced now in various types of kerosene vaporizers. In the form illustrated in the accompanying diagram, it will be evident that heating the mixture and securing heat to vaporize the heavy fuel is obtained by utilizing a portion of the carburetor as a fire box and putting a spark plug in this portion in order to secure the kindling of the gas when it is desired to start the engine after it has been standing for a time. This does not correspond to or is it a part of the mixing chamber, but is located

below it, so that the heated air and mixture from the preheating chamber rises through a stand pipe to go directly past the throttle. Since the heat is provided in the carburetor itself, there is no need of a hot air pipe from the exhaust manifold, nor is it necessary to jacket the carburetor. Gasoline is used for securing an easy start and priming so there is incorporated with the carburetor a gasoline supply reservoir above the float chamber through which the kerosene passes, so that the gasoline can be allowed to drip into the mixing chamber for starting purposes. The novel feature of using a spark plug in the carburetor is not a radically new one, inasmuch as it is covered by an English patent issued several years ago. A special form of spark plug is used, having but one electrode, this registering with a corresponding electrode screwed into the fire box body.



A KEROSENE CARBURETOR WITH A SPARK PLUG.

The fire box *J* is located at the bottom of the carburetor and contains an umbrella-shaped metal piece, *K*, known as the distilling table. The spark plug is connected in series with one of the plugs of the engine, so that with the four-cylinder engine there would be a spark plug in the fire box for every fourth spark in the engine. The fuel supply is directed to the float chamber in the conventional manner, the level therein being regulated by the usual float control mechanism. The gasoline supply is carried in a separate chamber above the float chamber. This chamber is filled through the action of a priming lever as the contents flow through the nozzle and into the air current by gravity. The current passes through the float chamber down through the nozzle and from there through four openings in the mixing chamber *D*, at the bottom, so that the fuel falls to the bottom opening into the curved surface *R* and falls from there to a baffle plate or supply screen *H*. Here it falls through the openings of a screen and drops to the top of the distilling table *K* and begins to float down the inclined surface of this table into the fire box, where it is ignited by the spark gap.

Only partial combustion occurs owing to there being an excess of fuel present and the resulting gas is drawn up through the fire box, through a vertical passage, back into the main stream of air from the mixing chamber and by the throttle which controls the amount of gas admitted to the engine.

It is claimed that after three seconds running the fire box is well heated and that in six to eight seconds the intake manifold is sufficiently warm to maintain uniformity of mixture to the cylinders. The device is so well heated that kerosene can be used in cold weather as easily as under more favorable operating conditions. All of the air flows into the one opening at the side of the mixing chamber, this opening being so formed that a downward whirl or eddy is imparted to the air, which carries the kerosene from the spraying nozzle. Once through the bottom of chamber *C* this air laden with kerosene vapor and globules of liquid, divides, part of it going directly above the stand pipe and part going down into the fire box, the amount going into the fire box being a relatively small portion of the total. The air entering the fire box through *E* is relatively free of fuel, so it picks up the kerosene dripping from the distilling plate. The lighter kerosene particles are carried direct as indicated by the arrows, while the heavier fuel particles go into the fire box, and are gasified before passing to the engine. It is claimed that the temperature can be regulated by raising or lowering the distilling table for which an adjustment is provided, so that its relation to the fire screen may be varied. On checking the draft on the fuel and air the temperature will be reduced by allowing greater draft, the combustion will be more energetic and the temperature will be higher.

When first starting this carburetor all of the fuel passes through the fire box and as soon as the distilling table temperature increases the more volatile elements are distilled from the fuel and the vapor thus produced results in a resistance to the flow of other than the heaviest bodies through the holes in the fire screen and this produces an increase of temperature in the member. As soon as pipe *G* is also heated to a point where all the lighter particles of fuel are well vaporized the heavy residue flows into the fire box to be partially burned. Great flexibility is claimed for an engine equipped with this carburetor, as it is believed by its makers that the use of a fixed gas is of more value than the ordinary system of attempting to vaporize a mixture with heavy liquid particles in it by the ordinary hot plate or heated jacket manifold construction.—*Scientific American*, 17/11.

LARGEST MACHINE OF ITS TYPE.—A 200-ton floating crane, built by the Wellman, Seaver, Morgan Company, Cleveland, Ohio, for the Norfolk Navy Yard, and the largest machine of its type ever constructed in the

BROADSIDE VIEW OF CRANE, TOWER AND PONTOON WITH POWER PLANT.

United States, is shown herewith in one illustration. This crane is mounted on a pontoon 140 feet long, 85 feet wide and 15 feet deep; it has a lifting capacity of over 200 tons, a reach of 62½ feet over the side of the boat, or a radius of 105 feet. The test load required by the navy, and which was handled successfully, was over 400,000 pounds. This crane resembles generally the ordinary revolving derrick in which the jib is rotated to the point opposite the weight to be lifted when it is lowered until the hooks hang above the object. The latter are then lowered or raised by means of steel cables passing over sheaves built into the end of the jib. The main hoist consists of two hooks fixed on the jib. When raised to its maximum height the latter is over 200 feet above water level, or it would tower over the roof of an eighteen-story building.

The crane rotates in a complete circle and this movement is controlled by two 60-horsepower motors. The boom luffs up and down from a practically vertical position to an angle of about 30 degrees in the horizontal in its lowest position and this movement is accomplished by two 10-inch screws, operated by two 60-horsepower motors.—*Marine Journal*, 26/1.

AIR PUMPS.—This rotary valveless air pump, designed to produce a high vacuum, consists of two main parts, the rotor and the drum, rotating

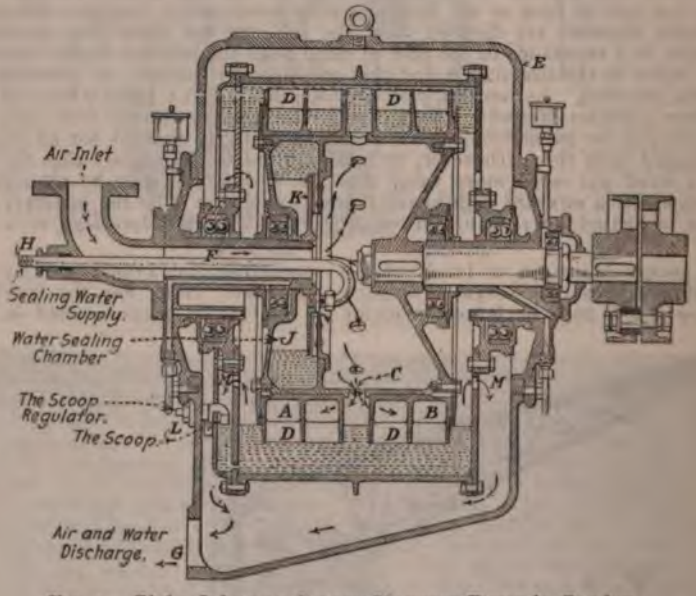


FIG. 1.—Globe-Johnston Rotary Vacuum Pump in Section.

on ball bearings in a specially designed casing. By a small modification the vacuum pump may be converted into an air compressor.

The rotor, Fig. 1, as applied for the vacuum pump, is a hollow member on the outer circumference of which deep double-thread screws are formed. A passage *C* runs between twin-screw threads *A* and *B* into the interior of the rotor. When the machine is producing a vacuum this passage acts as the inlet to the screw threads, but when air is being compressed it is

the outlet. Similarly, the pipe *F* running from the interior of the rotor to the exterior of the machine is the inlet pipe in the vacuum pump and the outlet pipe in the compressor. The screw threads are joined by a large number of narrow partitions or blades *D* which are equally spaced around the periphery of the rotor. The outer and inner edges of these blades are respectively flush with the top of the screw threads and half-way down the depth of the threads.

The ring of water is in the first place set up by the action of these blades in conjunction with centrifugal force. Annular rings *E*, called shrouding blades, fitted to the sides of the rotor and reaching somewhat below the water level on the discharge side, prevent the exhausted or compressed air from returning along the screws when the thread ends leave the water seal.

The rotating drum is a hollow cylinder also running on massive ball bearings. The drum when rotating contains the ring of water and is set eccentrically to the rotor. The relative eccentricity of the rotor and the water ring produces what is called the "working space."—*Engineering*, January.

INVENTOR OF NON-SINKABLE VESSELS EXPLAINS DEVICE.—*Buoyancy Boxes, Placed all Over Steamships, Will Render Ships Difficult Targets for Germans After They Are Equipped, Says William T. Donnelly.*—William T. Donnelly, naval consulting engineer, of New York, and a member of the Committee on Ship Protection of the United States Shipping Board, recently explained his invention for rendering cargo vessels non-sinkable. His work on the problem, he said, antedated the war by several years, and began when he found that a 20,000-ton non-sinkable dry dock he had arranged for the Grand Trunk Pacific Railroad proved a practical success.

Mr. Donnelly said that his patents for a non-sinkable ship, filed in the Patent Office, first directed attention to the invention, and that after careful study the Committee on Ship Protection submitted a report which General Goethals unqualifiedly approved. General Goethals, Mr. Donnelly said, also had recommended the application of the invention to the ships which the Emergency Fleet Corporation is building.

Generally speaking, Mr. Donnelly's scheme involves the use of "hull buoyancy boxes" and "cargo buoyancy boxes," the former supplying the necessary support for the ship itself, and the latter for the cargo. His description of his invention is as follows:

"The boxes are approximately 3 feet long and 2 feet wide by 1 foot thick, and are placed between the frames on the sides of the ship, between deck beams under all decks, and also against each side of all bulkheads. All boxes are carefully secured in place against movement from the rolling of the ship, and protected from the cargo by the usual cargo battens. The total number of hull buoyancy boxes on the *Lucia*, a ship of 10,000 tons dead weight capacity, was between 9000 and 10,000.

"Entirely independent of the hull boxes there are approximately 3000 cargo buoyancy boxes on the *Lucia*. This buoyancy is sufficient to support 8600 tons of coal when submerged in water, which was the amount of cargo that would load the *Lucia* down to her maximum draft line.

"The cargo boxes do not necessarily interfere with or reduce the amount of cargo carried, or only in an amount represented by the actual weight of the boxes. In other words, if the *Lucia* without the cargo boxes had been loaded with a cargo of coal down to her maximum draft line there would have been approximately one-third of her cargo space left empty, and it is this waste space that the boxes were devised to fill. It is further to be understood that these cargo boxes were so disposed as to protect the stability of the ship when water-logged, and also in those parts of the interior of the ship in which it would be more difficult to introduce and remove cargo.

"In case of other cargoes, the buoyancy boxes would be used in proportion to the weight to be sustained. In other words, the loading of the vessel to make it non-sinkable is an art to be developed with the thorough knowledge of the specific gravity of the cargo. In case of a cotton cargo, no cargo buoyancy boxes whatever would have to be used. My investigations show that the deduction in cargo space because of the buoyancy boxes will average between 10 and 20 per cent.

"The cost of the installing of the buoyancy and cargo boxes in the *Lucia* was less than 10 per cent of the value of the vessel.

"Regarding time of installation, the Ship Protection Committee now has before it an offer from a reliable concern to supply buoyancy boxes at the rate of 10,000 to 11,000 a day, and I believe that they can make a complete application to a ship of the same dimensions as the *Lucia* in from two to four weeks.

"The degree of safety achieved by these boxes can be judged from the fact that 12,000 boxes are distributed over the hull of a ship 400 feet in length, and that the largest breach of a torpedo does not exceed a hole 25 feet in diameter, which would probably destroy from 50 to 100 boxes. The margin of safety is such that from 80 to 100 feet of the side of the vessel could be destroyed without causing the ship to sink.—*N. Y. Herald*, 15/2.

AERONAUTICS

IS THE MONOPLANE COMING BACK AGAIN?—From France comes the report that the monoplane is again coming into favor in the French air service. The Morane parasol monoplane, in which the planes are placed some distance above the fuselage so as to give the pilot unhampered view, has been improved and is now being reintroduced. The Morane parasol was one of the three types of airplanes with which France entered the war, but after a few months of actual service it was dropped. In its present form this monoplane is said to be a wonderful climber and to possess a great speed.—*Scientific American* 2/2.

SMOKE CAMOUFLAGE FOR AIRPLANES.—It is reported that the Gotha airplanes which raid England from time to time, are equipped with apparatus for producing smoke clouds for purposes of concealment. The smoke cloud is usually emitted when the raiders are threatened by anti-aircraft artillery; and since it has the same color and formation as the fleecy clouds overhead, the task of the gunners below is made far more difficult.—*Scientific American*, 2/2.

FLIGHT (LONDON), DECEMBER 6, 1917.—*The Danger of Over-Standardization* (Editorial).—We are glad to hear that the Air Board has addressed a communication to the Aircraft Production Board of the United States on the subject of the danger arising out of over-standardization of aircraft, a subject to which attention has frequently been directed in these pages. As to the usefulness of standardization within limits there can be no two opinions, but it is quite possible for the keenness for output to work to our great disadvantage. In considering the problems attending the construction of aircraft, we have to keep it well before us that the design of to-day is likely to be rendered hopelessly obsolete by that of to-morrow, and it is thus folly of the worst description to put all our eggs into the one basket. We are not implying that that is the policy which is being pursued in America, but we do think there is a danger that our allies' enthusiasm for manufacturing efficiency and huge outputs might tend to lead them a little astray. Evidently this view is shared to some extent by our own authorities, and hence the warning which is said to have been given. No undue importance need be attached to the fact that the Air Board has thought it necessary to give America what may really be called a friendly tip. There is

certainly no divergence of opinion between us and our allies regarding the future of war in the air. All that has happened is that a little advice, born of our greater experience of war, has been tendered by the one and accepted by the other in the spirit of absolute friendship.—*Rudder*, 15/1.

MAKE COMPLETE LIBERTY ENGINES IN FORD PLANT.—All available parts of the Detroit plant of the Ford Motor Company not now engaged in government war work soon will be devoted to high speed production of Liberty motors for America's airplane fleets. The Detroit factory has been turning out cylinders and other engine parts for several months, but the new program disclosed to-day provides for wholesale production of the completed engines. Recent tests of the Liberty motor indicate that a minimum of 400 horsepower can be expected from the new engines.—*N. Y. Herald*, 13/2.

NEW PROPELLER SHAPING MACHINE.—"The Will to Win" has caused many ingenious machines to be designed for the purpose of speeding up the production of struts, propellers, and other pieces of airplane woodwork.

Extreme accuracy as to weight, balance and form is vital, and must be taken into consideration by the designer of any wood-working machine to make it a success on airplane parts. Especially is this true of the two-, three-, or four-blade air screws. For this reason many of the standard wood-working machines have proven altogether inadequate to these exacting needs.

One of the latest machines to be offered to the manufacturers of airplane woodwork is a special propeller shaping machine which will handle the three- or four-bladed screws, as well as the two-bladed ones. It is built by the C. Mattison Machine Works, Beloit, Wis.

The Mattison Company has thoroughly studied the requirements of a propeller lathe, and with the cooperation of some of the biggest manufacturers in the country has perfected a machine which bids fair to revolutionize the production of propellers, on account of greatly increasing capacity, as well as of much smoother cutting. This works so close to finished size that very little hand work is necessary after the machining operation. The manufacturer of this lathe will be pleased to supply to any one interested in the manufacture of propellers any detailed information regarding the construction and operation of the machine.—*Aviation*, 15/1.

AERONAUTICS (LONDON), NOVEMBER 21, 1917.—*A Zeppelin Surprise.* By Jhadoo Jahaz.—The writer examines the conditions which the Zeppelin airships had to fulfill, during their last raid on the British Isles, in order to reach the extraordinary altitude from which they delivered their attack.

For this purpose the author had at his disposal the following table of estimated weights of the Zeppelin *L-49*, which had been prepared by Mr. Warner Allen:

	Tons
Hull framework	12
Outer cover and gas bags	5
Planes	1
Framework of cars	1
Power plant	2½
Fuel tanks	1½
Armament, wireless	½
Miscellaneous	1
Total	24½

The gross lift of the modern Zeppelin being assumed as 60 tons, it follows that 35½ tons remain available for "disposable weights," such as crew,

fuel, bombs, and water ballast. Of this, 1½ tons are taken up by the crew, 5½ tons by the fuel supply, and 2½ tons by the bombs, so that the Zeppelin must carry in the neighborhood of 26 tons of ballast. The latter amount the Zeppelin fully needs for attaining the 20,000-foot level, provided allowance is made for additional dynamic lift.

It will be seen that these figures closely tally with those computed in the December 15 issue of *Aviation and Aeronautical Engineering*, although there is necessarily a certain variance between the two estimates of weights of the structural parts of the Zeppelin.—*Aviation*, 1/1.

MILITARY AIRCRAFT AND THEIR ARMAMENT.—*Tactical Maneuvers and Developments That Have Resulted.*—By Jean Abel Lefranc.—The technical elements to be considered in aerial combat are based upon the qualities of the aeroplanes engaged, such as armament, speed, facility in handling, altitude capability, etc. These tactical and technical elements may be divided into two sorts, which though very different are intimately connected.

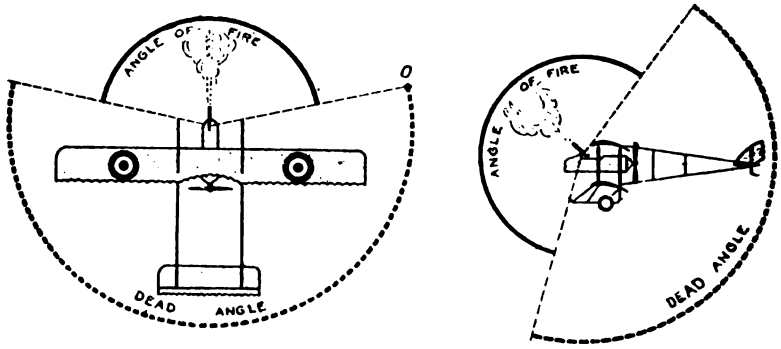


FIG. 1.—Firing Area and Obstructed Area of a 1915 Farman.

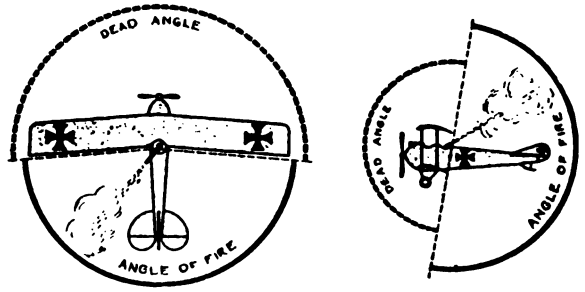


FIG. 2.—Firing Area and Obstructed Area of a 1915 Aviatik.

The combat begins by a series of tactical maneuvers by means of which the assailant seeks to get as many initial advantages on his own side as possible, by surprise, by a greater altitude, by a group attack, by a rear attack, etc. It is ended by the actual contest between the machines, continued till one side or the other is destroyed or put to flight.

It is evident that the preliminary tactics can be executed only if the technical qualities of the avion make them possible. Freedom to choose between engaging in combat or avoiding it implies superiority of speed

If the machine possesses the four technical superiorities of the ideal airplane, speed, climbing, armament, ease of handling, then its pilot has all the tactical advantages on his side.

But an airplane may have a single one of these technical superiorities yet be unable to gain any tactical advantage therefrom. For example, the Voisin gun-airplane, with its 37-caliber rapid fire guns was superior in armament to most of the enemy airplanes of that period; but since it had no speed, was not easy to manage, and could not rise, in practice, above a height of 2500 meters (8125 feet), it was almost never able to profit by its advantage of armament. The enemy airplanes profited by their speed and

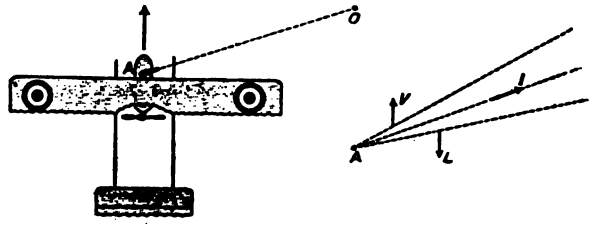


FIG. 3.—Deviation of Trajectories in Consequence of the Displacement of the Airplane.

facility of management to attack it without getting within its very limited range, their superiority in climbing enabling them to refuse combat by rising to a height of 5000 meters (16,250 feet). The technical elements are identical in all aeroplanes of the same type, but their employment in combat, *i. e.*, their tactical application varies with the ability of the individual pilot in each particular case. The utilization of the tactical elements is so dependent upon their intelligent application by the pilot that it often occurs that airplanes technically inferior in all points obtain tactical

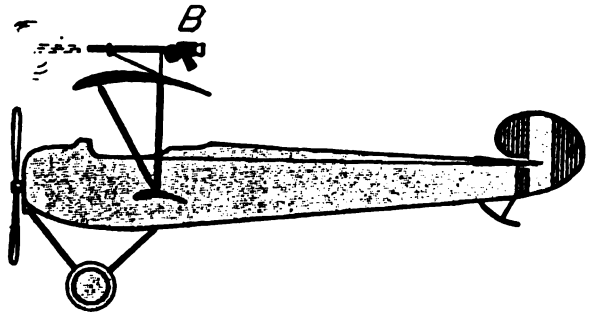


FIG. 4.—The Fixed Machine Gun of a Nieuport.

advantages by reason of the courage and skill of their pilots, and even absolute victories, over adversaries better armed, faster, and more easily handled, *e. g.*, the old Farmans of 1915 over the Aviatiks of that year.

Our "Aces" in particular furnish an excellent example of good tactical handling of their machines. In general, however, it must be admitted that technical superiority is the surest method of achieving tactical superiority in the fight. Superiority of material equipment has been the chief basis of all German tactics in terrestrial combat.

The relative importance of each of the technical factors in air fighting varies according to the work required of the machine. For a fighting air-

plane the order of importance is as follows: speed, ease of handling, armament, and altitude. The German pilots who have been taken prisoner declare that the superiority of the Nieuport and the Spad over the "chaser" Albatross lies chiefly in their extreme ease of handling, the other factors being practically balanced

Airplanes for artillery, photography, petty bombardment, or protection, which by reason if their specialization of function cannot be made fast enough to avoid combat, should be constructed with a view to technical

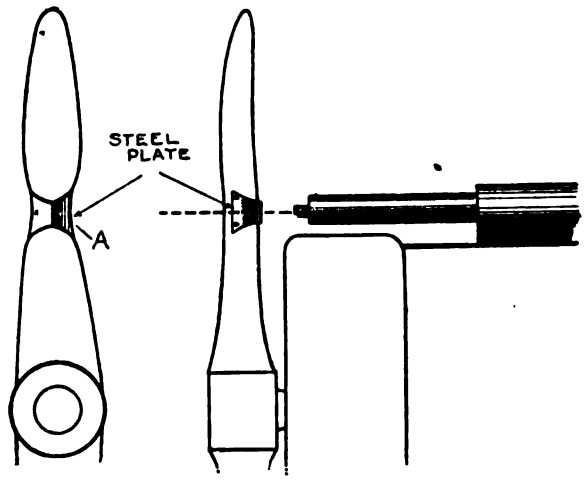


FIG. 5.—Garros Type Propeller for Firing Between the Blades.

superiority in defensive armament. Handling and speed are less important elements than for fighting machines.

The big airplane intended for bombardment by night demands entirely different technical qualities, such as capacity, radius of action, facility in landing, etc.

The present speed of French and German chasing airplanes varies between 180 and 200 kilometers per hour (110 to 123 miles per hour); it

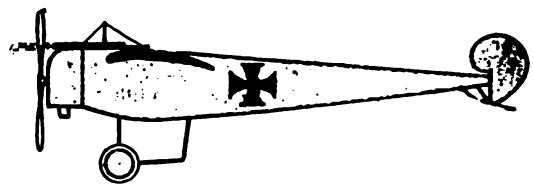


FIG. 6.—Arrangement of Gun in 1915-16 Fokker.

might be much greater but for the fact that these machines are obliged to keep enough wing-area to enable them to raise their weight of a thousand kilograms (2200 pounds) to a height of 5000 or 6000 meters (roughly speaking, 16,000 to 20,000 feet), and to land on a chance terrain without being upset.

The present speed of airplane of artillery, photography, petty bombardment, and protection is from 125 to 150 kilometers per hour (cc. 75 to 90

miles), while that of airplanes for night use may easily remain as low as 90 to 120 km. per hour (cc. 50 to 65 miles), in case the exigencies of capacity demand it.

No limit is set to improvement in ease of handling, especially in machines specialized for combat. Knowledge of the formidable strains and pressures which come into play on surfaces of an extent of 25 square meters (the spread of the Albatross chaser) has arrived at such a point of precision that all sorts of aerial acrobatics are permissible, especially for chasing airplanes without any fear, normally, of ruptures or deformations.

If there are still numerous accidents due to ruptures they must be ascribed to inevitable imperfections caused by the necessity of producing large quantities of machines in a short time and of entrusting delicate bits of construction to mechanics too hastily trained.

Facility in maneuvering is a function of the judicious distribution of the strains to which the airplane is subjected; the ascensional strain, gravity, and the strains resulting from the use of the controls.

But after all the armament remains the decisive factor in the combat, for it is this which destroys the power of the enemy.

FIG. 7.—Position of Gun on 1917 Albatross.

I.—At the beginning of the war, when aviation had a relatively obscure rôle, and had not assumed the importance of a factor indispensable to victory, the necessity of the "mastery of the air" had not yet made itself felt, and aerial combat was a rare event. The airplanes went out armed with a carbine or rifle, and were generally careful to refrain from attacking. Then, little by little, each desiring to keep secret his own preparations, but seeking to know those of the enemy, combats became frequent. It became necessary hastily to mount machine guns with improvised supports which had to be perfected very rapidly. This was the first period of aerial combat, which had scarcely more than a single formula of armament. The airplanes, all two-seaters, were provided with a machine gun operated by the passenger.

The majority of the French airplanes, having the propeller at the rear, had behind them a considerably obstructed area or blind spot which favored surprise attacks. The machine gun, being generally placed on a pivot in the front of the nacelle, either to the right or to the left, made it difficult to defend the airplane on the sides (Fig. 1).

The German machines, having the propeller in front, had the machine gun at the rear. Their weapon was quickly mounted upon a pivoted turret which permitted it to be rapidly turned in order to fire to the right or the left. The obstructed area was in front and under the observation of the pilot (Fig. 2).

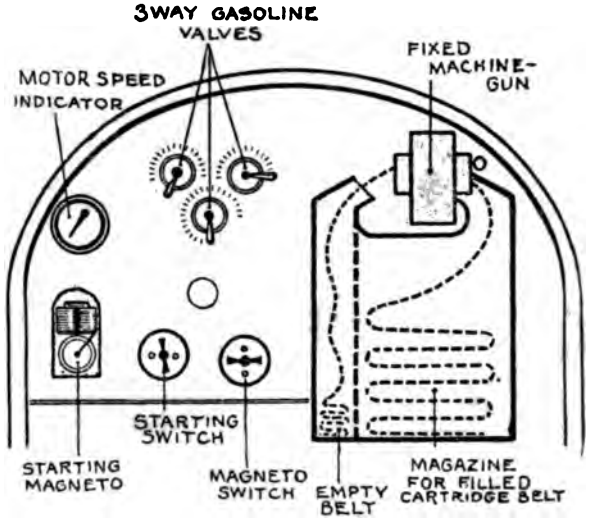


FIG. 8.—Position of the Fixed Machine Gun in the Fuselage (as Seen by the pilot).

It was quite surprising to observe how often furious combats at a short distance had no practical results except for a few balls in the wings. In the first place the munitions were limited. Either a few belts of 25 cartridges each or a drum of 100. The functioning of the machine guns was delicate, the supports not very practical, and the precision of the fire incredibly defective. The causes of this inaccuracy were many, proceeding

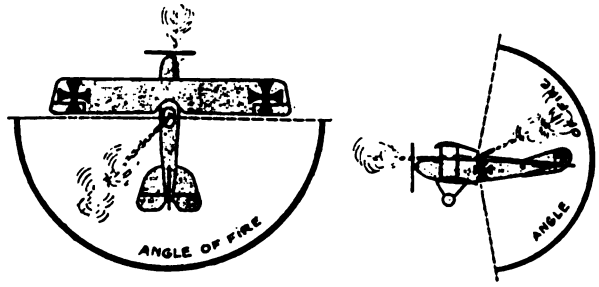


FIG. 9.—Firing Angle of 1917 Albatross C.

chiefly from errors of aim due to the relative speeds to the two combatants; but owing likewise to the very considerable vibration produced by these over-light machine guns, which prevented all accurate aim; also to the inconvenient positions the gunner was obliged to take in order to fire in the direction *O* as shown in Fig. 1; and finally to the difficulties in handling a heavy arm in a wind of 100 km. per hour (60 miles per hour).

Moreover, the trajectories of the shots fired, at the side, towards *O* (Fig. 3), were thrown out of line by new forces: the initial lateral speed, produced by the speed of the airplane (force *V* Fig. 3), the lateral wind pressure upon the projectile by this same speed (force *L* Fig. 3); two forces *V* and *L* which are compounded with the initial speed *I* of the ball and deform the trajectory.

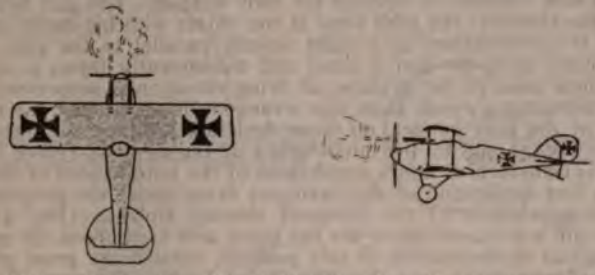


FIG 10.—Firing of the Two Fixed Machine Guns in the Forward Part of 1917 Chasing Albatross.

The sight of the gun, moreover, ceases to give a precise indication for arms which fire almost vertically, above or below, and but rarely in a horizontal plane. The distance of the shots is generally less than 400 meters (1300 feet) and if we note this element of error it is merely to add it to the preceding causes to show the great difficulties involved in aerial firing.

II.—The second period comprises the organization of the armament on board airplanes of specialized missions. Three principal formulas have been adopted by our enemies as well as by us:

1. Firing forward by a fixed machine gun shooting above the propeller or through it (one-man machines).

2. Firing forward by fixed machine gun shooting like the preceding, but with the addition of a machine gun on a tourelle shooting towards the rear (two-seaters).

3. Firing forward by a machine gun on a tourelle, towards the rear by a machine gun on a tourelle, and under the fuselage with the gun on a pivot (three-seaters).

FIG. 11.—Parabellum Mitrailleuse Movable on a Tourelle.

A, lateral reel carrying a band of 250 cartridges; *B*, sack into which the shells are ejected; *C*, jointed fork; *D*, carriage revolving on the turret. Weight 12 kilograms (26 lbs.). With 250 cartridges and accessories 32 kg. (70.4 lbs.).

The constructors have been led to study the formula of fixed firing towards the front, either through the propeller or above it, in the first place to enable one man machines to become fighting machines, and next to avoid all the inconveniences indicated above in the case of movable guns on tourelles or pivots.

Evidently the first result of employing a fixed gun is to enable the pilot of a one-man machine to operate his own weapon. The gun fires in the axis of the airplane; the pilot aims at the object with his entire machine; the aim is accomplished by a sight strictly parallel to the gun. In the second place, since the gun is fixed and consequently forms a solid part of the whole mass of the airplane, all firing vibration is suppressed.

Other advantages result from this arrangement of the gun, the excellent position of the pilot gunner, no more deviation produced by lateral wind (force *L* Fig. 3) and by the initial speed of the airplane (force *V*); this force *V* is transformed into a supplement of the initial speed of the ball.

1. The first application of the fixed gun firing above the propeller dates from the appearance of the Nieuport chasing biplanes (Fig. 4). This machine gun was placed above the top plane, and fired above the propeller. The principal inconvenience of this position, outside the great resistance to forward movement, was the difficulty of loading the arm. To reload the gun the pilot turned it upside down in *B*, and was then able to remove the discharged disk and replace it with a new one containing 47 cartridges. These 47 shells were quickly fired at the rate of three or four hundred per minute.

FIG. 12.—Fixed Maxim Machine Guns.

A, arrangement for synchronizing from the motor; *B*, grip of bowden control governing the fire. Weight 13.3 kilograms (29.26 pounds). With 500 cartridges and support 36 kg. (79.2 lbs.).

It is easy to fancy the difficulties encountered by the pilot, who not only had to drive his machine, but fire and reload his weapon. In fact, if the pilots of our first Nieuports did not obtain a decisive result with the first disk, they were obliged to stop fighting. The second application of the fixed machine gun was the shooting through the propeller, first practiced by Garros. At first thought the principle of this seems extremely curious. The gun was fired in the normal manner. To keep the balls from striking and breaking the blades of the propeller two plates of extremely hard steel were fitted onto the blades at the point where the balls passed (Fig. 5). The balls which hit these plates were deflected and lost, but the others passed betwen the blades and continued their course towards the objective. The percentage of balls lost was negligible, being less than seven or eight per cent.

But a latent defect soon brought about the abandonment of this arrangement; this was a loss of speed on the part of the airplane of 20 km. per hour (65,000 feet or over 12 miles). As a result of its transformation the propeller lost a part of its tractive force, a reduced efficiency resulting from the tapering at *A*, a reduction of the pitch of the propeller being made to compensate the resistance of the steel plates, and thus maintain the motor in its normal action (Fig. 5).

This technical superiority of armament could not compensate in a chasing airplane for the tactical inferiority proceeding from a lack of speed.

The third application of this formula was invented by the Germans at the time their Fokker chasing single-seater appeared (Fig. 6). The fixed

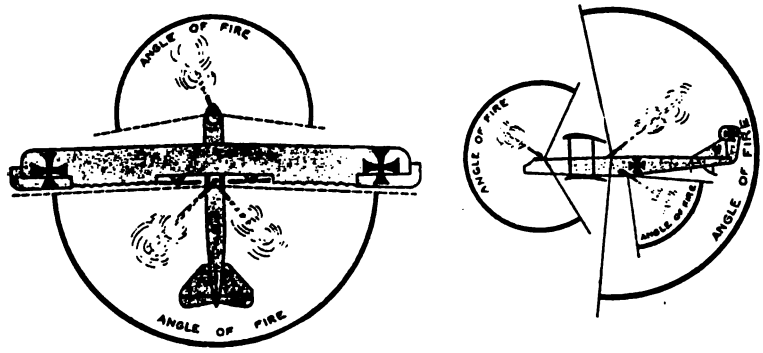
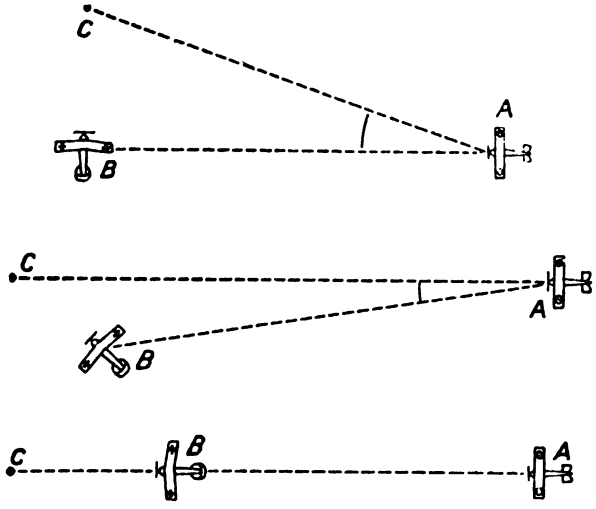


FIG. 13.—The Position of the Machine Guns, the Zones Under Fire with the 1916-1917 Gotha.

machine gun fires through the propeller, but it is governed by the motor, its action being synchronous with that of the motor. The propeller making 1400 revolutions per minute, and having two blades, it is obvious that the barrel of the gun is crossed by the blades 2800 times per minute, hence the



FIGS. 14, 15, 16.—The Direction of the Fire, Taking Into Account the Relative Displacement of the Enemy.

regulation of the firing must be sufficiently precise to permit the balls to pass in these intervals (a 46th of a second).

The control of the machine gun by the motor is effected by suitable gearing (Fokker, Albatross, D. Halberstadt, etc.), or by flexible transmis-

sion (Albatross, C. Rumpler C). The pilot operates his weapon at will by pressing on the grip of a Bowden control.

This application of firing through the propeller by synchronization of the machine gun with the motor is the arrangement adopted on the majority of airplanes, whether belonging to the French, the allies, or the enemy. The gun as sheltered under the hood of the motor (Fig. 7), its feeding is easy, and likewise clearing it of empty magazines. The cartridge boxes (Fig. 8) are capable of holding belts of 800 to 1000 cartridges per weapon.

The chasing airplanes are usually one man machines, it being found preferable to omit the observer to obtain a machine which is speedier, easier handled and capable of going higher and farther.

The German series of Albatross D I, D III, Halberstadt Roland D, Ago D, Fokker D, have two fixed machine guns firing through the propeller, and each provided with 1000 cartridges (Fig. 10).

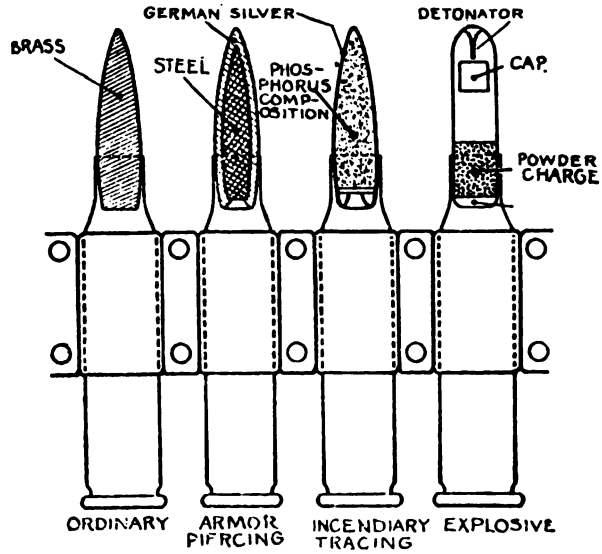


FIG. 17.—German Ammunition.

2. Another formula of armament (Fig. 9) exists for less rapid two-man airplanes, charged with the mission of directing artillery fire, taking photographs, or making petty bombardments. This series corresponds to the Albatross, Rumpler, Aviatik, L. V. G., the whole series of C, two-seaters, flying only from 140 to 160 km. per hour (cc. 85 to 97 miles).

Their armament is defensive; a forward machine gun fires through the propeller, this being of special service when the defence of these machines requires them to attack, and a rear machine gun is mounted on a tourelle. We have likewise adopted the same arrangements for our airplanes of equivalent series.—*La Nature (Paris), Scientific American*, 8/12.

SUBMARINES

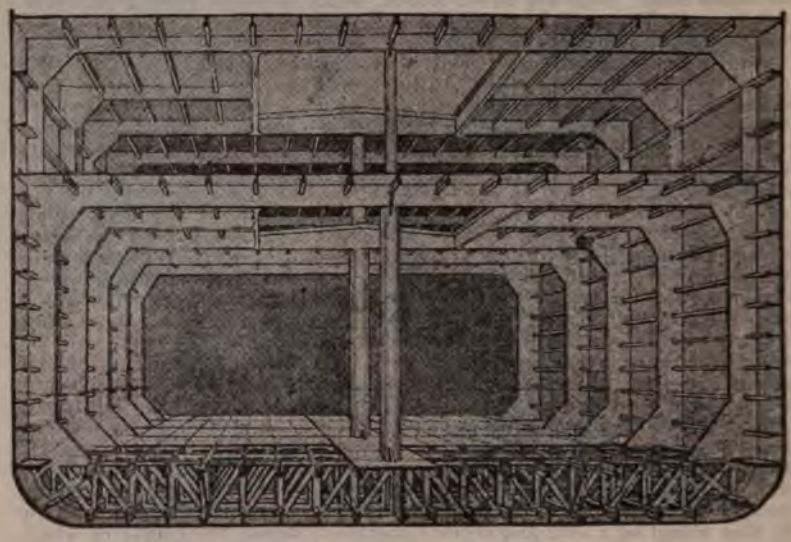
The Shipping Council of Great Britain is now considering a plan for the building of a number of towed submersible cargo carriers, which is backed by Prof. Vernon Boys, Prof. Hele-Shaw, and several leading shipbuilding firms and shipowners. The main idea is to have submarine cargo boats

that will be towed by tugs with their steam engines converted to the use of liquid fuel. That will avoid smoke, which indicates their presence to the enemy. They will be low-lying tugs, with not much top hamper, and will be armed and fitted with wireless. When a U-boat appears the tug would instantly slip its cable while the submarine cargo boat would sink to a depth already arranged. The tug would then be free to do its best, either to escape or to fight the enemy submarine with its own guns. The U-boat would probably know the tug had been towing a submarine cargo vessel, but would not know at what depth it was, or what had been its distance from the tug. Her torpedoes may have been set to 8 or 10 ft., so that her firing would be absolutely blind. But in the meantime the tug would have sent out a wireless message saying where she had dropped her cargo vessel. The message would be picked up by the nearest destroyer or aeroplane station, and help would soon be on the way. With regard to the cargo vessel itself, the inventors have taken out seven patents, the most important being one of Professor Boys, which regulates automatically the stabilizing of the submerged vessel at any pre-arranged depth. By another patent, after a certain number of prearranged hours two buoys will be released from the submarine cargo boat. One will be attached to the end of the cable that was dropped by the tug and the other will be attached to the boat itself. These buoys will show strong lights at night, so that after, say, 10 hours these buoys will indicate to the destroyers or aeroplanes the position of the dropped vessel. As the cargo boat will be much heavier than the U-boat, if the latter tries to search below the water for it the danger of a collision would be much greater to the enemy than to the submerged vessel. If the U-boat comes to the surface and tries to drag for it, that would be a long and tedious operation, during the course of which the enemy would probably be caught by destroyers or in danger of being spotted by aircraft carrying high explosive bombs. Some of the advantages claimed for the submarine cargo boats are its extreme simplicity and cheapness of construction, and the rapidity with which they can be turned out. Several shipbuilding firms have examined the matter, and have stated their readiness to at once start building directly government permission is obtained.—*Shipping*, 26/1.

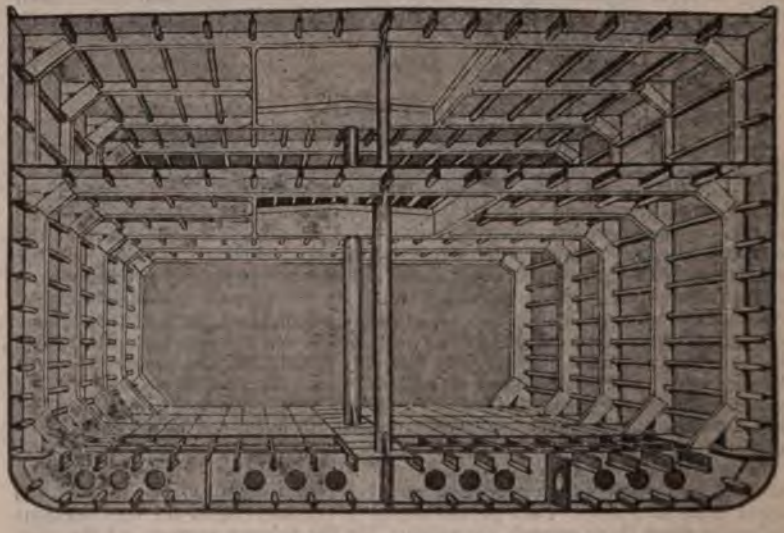
MERCHANT MARINE

CAST STEEL SHIP CONSTRUCTION.—By Mr. Myron F. Hill.—The demand for ocean tonnage is such that it calls for the most active co-operation of shipbuilders and of labor. Though the program of the Emergency Fleet Corporation may seem large, it is small in comparison with existing transportation requirements, and the continuous shrinkage taking place in the world's tonnage through submarine sinkings and through ordinary marine casualties. The great question before the country to-day is production or output of tonnage, which is being limited by the lack of skilled labor. As one means of overcoming this labor difficulty the cast steel ship has been designed. This type of vessel will be constructed by the Cast Steel Ship Company, and plans for suitable foundry plant and equipment are now being made. The cast steel ship will be cast in sections and welded together by the Wilson method of welding. This method of welding has been thoroughly tested, being the method used in the repairing of the recently owned German merchant vessels now in service under our flag.

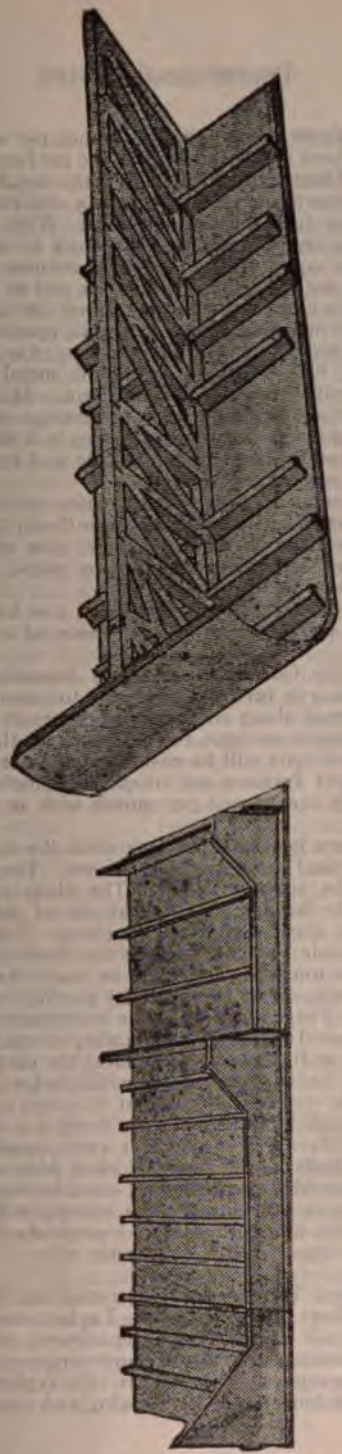
The welding of sections together will eliminate rivets, brackets, angles, straps, laps, and other connection metal forming 10 to 20 per cent of the steel used in a ship. Part of this metal is transferred to the cast sections to make them thick enough for casting for the thinner portions of the ship. Welded joints are planned for strength, and will be 50 per cent greater than plates to provide safety at joints. These joints, free from molecular action due to the mass strength of welded metal, will have approximately



SECTIONAL VIEW OF CAST STEEL SHIP.



SECTIONAL VIEW OF WELDED STEEL SHIP.



Cast Steel Ship Sections to be Welded Into Ship.

a tensile strength of from 62,000 to 64,000 pounds per square inch. Welding with an arc of fixed heat and speed insures the perfect adhesion of welding to castings. By welding automatically, a ship can be sectionally welded every week under expert supervision by using electrical equipment and by having unskilled labor feed the welding wire. With a regular yard crane outfit a ship can be assembled, and within a week be made ready for installation of engines and equipment. The inner bottom and decks and bulkheads of rolled steel are welded to framework and to the cast steel shell.

The Cast Steel Ship Company will operate on the division of labor principle. Under competent supervision gangs will operate through the shops, making mould after mould with proper devices. On completion of mould forms, pouring will be performed by liquid metal being conveyed on modern travelling cranes over forms and run. Moulds will then stand 24 hours, gates and risers knocked off, and castings extracted and cleaned. On account of variations in shrinkage, castings will thereafter be assorted, the largest castings being placed in the middle and tapered off to fit. The sections will then be electrically welded.

The Isherwood system of vessel construction proves ideal for casting. Ribs in two directions keep the castings free from buckling in handling. Castings provide overhanging ribs and lugs upon shell and framework, where the edges meet, so that castings when placed are forced together, bringing shell and overhang into position.

No scaffolding is necessary when castings are located, the automatic welders being set to work under the supervision of a few skilled practical men.

The Cast Steel Ship Company's program depends upon new foundry equipment, as open-hearth furnaces are used for treating the pig. It will take a gang of workmen about six weeks to construct one furnace. Three mould outfits will supply castings for practically half of a ship's length. The bow and stern sections will be cast from separate moulds. It is estimated that with proper furnace and mould equipment, about 500,000 tons of ship shells or hulls can be cast per month with 10 ways for assembling and launching.

The drawings shown herewith indicate what the company contemplates doing, although the final forms are not given. The final forms contain features which will be published later.* The plans of the cast steel ship have been reviewed by leading naval architects of this country who have warmly congratulated the designer on his plans. The success of the cast steel ship has been made possible through the development of the welding system which enables joints, as stated, to be made stronger than the shell itself at a minimum amount of labor and by the improvements made in the art of casting steel. These are due to the encouragement afforded by the railroads where cast steel is rapidly supplanting riveted structures, as it has proven more durable and reliable, and reduces the cost of maintenance.

The cast steel ship has a smooth hull, which helps to increase its speed, and is lighter than the riveted ship, so that its cargo capacity is augmented and its speed again aided. It is from 10 to 25 per cent stronger than a riveted ship in its different parts, and is correspondingly more durable. The cost of building hulls by this process, when done on a sufficiently large scale with machine moulding processes, is considerably reduced.

The two great factors of value are the celerity with which vessels can be built and the small amount of labor—particularly of skilled labor—required to complete ships.—*Nautical Gazette*, 7/2.

THE CONCRETE SHIP.—The success of the concrete ship must result from slow development. Rear Admiral D. W. Taylor, chief of the Bureau of Construction and Repair of the Navy Department, on January 21 before the House Naval Committee was asked concerning experiments with a non-sinkable concrete ship suggested by Maxim. He replied that several different devices had been submitted by Mr. Maxim, and certain tests and experi-

ments had been made which, he thought, were satisfactory to him. He further said:

"The question of the concrete-ship protection, when it first came to us, did not come from Mr. Maxim. Certain people abroad have given a great deal of investigation to it, and a great many investigations and experiments have been made, and we know their results. I do not believe that any experiment that we would make would add very much to the information, although not familiar at the moment with Mr. Maxim's last development of the concrete ship. He started out with an entirely different device, not involving concrete, which we tested on a small scale. On one plan of using concrete to protect merchant ships it is associated with building an extension or bay window on each side of the ship—a blister, the technical English name is. That was suggested a number of years ago, and some ships have had these blisters applied, and in addition we have found that if you put a foot or two of concrete on the original hull of the ship—the blister projects practically 10 feet out from the original hull—it is effective in preventing the explosion reaching the interior of the ship proper. The real difficulty with all these devices—there are any number of devices which can be applied to add to the protection of merchant ships—but the real difficulty in the case of this blister, for instance, is that it would not only reduce the speed materially, but it would require perhaps 20 per cent of the material of the original hull, and the effort to apply it to the merchant ship would be, say, 20 per cent of the effort involved in originally building the ship. . . . . Whenever these concrete people come to me I ask them: 'How does the weight of your ship compare with the weight on the ordinary system?' I have seen none who have looked into it carefully who will claim that a concrete ship will not weigh 15 or 20 per cent more than the ordinary type of vessel, and I have not seen any inventor who believes that the concrete ship can be built as light as the steel ship. There have been some small concrete ships built in Norway and an 80-foot tug. There is an enterprise on the Pacific coast, I believe, which is undertaking to build 5000-ton vessels of concrete, and there are various other people undertaking to build concrete ships. . . . . I feel if the concrete ship comes, it will have to come just as the iron ship came and the steel ship. The steel ships have been built by trying them out until we know pretty well now what we can do in strength of steel ships. It has never been just exactly determined, as in building a bridge, where you know what will be upon it. I believe the concrete ship will come, if it does come, step by step, advancing, say, from 80 to 120 feet and from that to 150, and so on. . . . . There is another factor in the concrete ship. Concrete has behaved very badly in a number of cases in sea water. The technical press has just been running a series of articles by a man from the Bureau of Standards, going particularly into the question of damage to reinforced concrete in sea water. We have had some troubles in the navy, at Boston particularly, with some piers we have built there."—*Army and Navy Register*, 2/2.

BRITISH EXPERIENCE WITH CORRUGATED STEEL SHIPS.—Consul General Skinner at London reports:

Considerable interest has been created in Great Britain in consequence of the recent public statement of Mr. Axel F. Ericsson, Chairman of the Ericsson Shipping Company and the Monitor Shipping Corporation, setting up the claim that the corrugated ships recently built by his concerns have proved to be extraordinarily successful in every respect.

The corrugated steel ship is produced from patented designs and is distinguished mainly by the fact that the necessary strength is obtained by deep corrugations instead of a structural framework.—*Official Bulletin*, 9/1.

FIRST GERMAN CONCRETE STEAMSHIP COMPLETED.—The first German freight motor vessel to be built entirely of reinforced concrete has just completed its trial trips at Hamburg. According to the *Fremdenblatt* it is

made of "a new kind of concrete which weighs only half as much as gravel concrete." The newspaper expresses the opinion that an epoch-making innovation in ship construction has been made by this new German invention, "which has a great future in the building of river boats, sea boats and large ships."—*N. Y. Herald*, 14/2.

"TORPEDO-PROOF" VESSEL PROPOSED BY HUDSON MAXIM.—Hudson Maxim, inventor, outlined to the Senate Ship Investigating Committee a scheme for ship construction which he said would minimize the effect on merchant vessels of explosion of torpedoes, by instantly disintegrating through a cooling process the gases formed by the explosions. He said he had sought in vain to interest the Emergency Fleet Corporation in his proposal and that he came to the committee in the hope that the government would conduct experiments to determine its worth.

His scheme, the inventor said, was to line the inside of the hulls of vessels with cylinders containing water with a steel screen behind them. When the torpedo exploded, the water tanks, he said, would be hurled against the screen, atomizing the water, which would disperse the heat and absorb the gases. A cargo such as apples, potatoes and similar produce containing a large percentage of water would serve just as effectively as the tanks, he said.

Mr. Maxim declared that the Ship Protection Executive Committee had made an "irrelevant and untrue" report on his scheme, asserting that it would be expensive and ineffective on vessels of less than 10,000 tons. He denied that the scheme would be costly and said it would operate on vessels of 3000 or 5000 tons practically as well as on larger vessels.

Concrete ships, the inventor said, offer a greater advantage in combating the submarine menace than steel or wooden vessels, as they give greater resistance and absorb heat better. A concrete hull, he said, would localize an explosion, and he strongly urged construction of concrete skins for steel vessels.

He said the nations fighting Germany either must stop the submarines from leaving their bases or build torpedo-proof vessels, as he did not think they should attempt to offset the submarine campaign by building new vessels.—*N. Y. Herald*, 17/1.

MISCELLANEOUS NOTES

DEEP SEA DIVING MACHINE PROGRESS.—Aside from other considerations it is but natural to expect that the war with its attendant submarine and kindred activities has drawn attention to the hitherto limited scope of salvage operations where deep water sinkings are concerned, and has turned men's thoughts to the devising of means whereby present and past difficulties may be overcome and the sea be forced to yield back a moiety at least of the vessel treasure which is so ruthlessly, unceremoniously and continuously being committed to its keeping. Irrespective of the wonderful strides that have been made in the arts, crafts and manufactures during the past half century or less, it is a remarkable fact that in operations beneath the surface of the water, little progress is to be recorded. Vessels valuable in themselves and equally so as regards their cargoes strew the beds of the world's seas and of the Great Lakes of the North American continent.

The method of raising ships employed to-day is familiar to most people and it has been long enough operative to make them assume, if not believe that it is the one and only way. In essence, it consists of a diver equipped with a rubber diving suit, copper helmet, and heavy leaden-soled shoes. Such an equipment makes it practically impossible for the man to work efficiently even in shallow water. Again, in depths greater than 300 feet the water pressure makes it impossible even for an individual of exceptional physique to do work of any kind.

REAR VIEW OF LOWER HALF OF DIVING MACHINE.

INTERIOR VIEW OF LOWER HALF OF DIVING MACHINE.

Spasmodic attempts have, of course, been made by inventors, scientists and engineers to overcome the inefficiency noted, but the limited nature of the sphere of application and the problematical value of the monetary returns, have contributed materially to restrict and confine effort to the preparation of nothing more tangible than designs and the filing of patents. Times have changed, however, as a result of enemy submarine activity; in a word, the old adage that "It's an ill wind that blows nobody good," is in process of being demonstrated, hence the appearance on the horizon of practicability, for the recovery of sunken ships, and such cargoes as are not destroyed by the action of sea water, as well as bullion, of the Sisson Deep Sea Diving Machine, by which name the apparatus is known.

The Sisson Deep Sea Diving Machine has been designed by W. D. Sisson of Alpena, Mich., and 115 Broadway, New York City, and consists of a hollow iron sphere 90 inches in diameter, within which are installed the necessary pumps, propellers and drills, the latter to perforate the sides of

SIDE VIEW OF LOWER HALF OF DIVING MACHINE SHOWING HULL DRILLING MECHANISM.

ships' hulls. There are also embraced a thrust arm with which to insert lifting hooks into the drilled holes and four electro magnets of some 2½ tons holding capacity, arranged to operate in pairs. The electro-magnet control admits of the diving machine creeping along the sides of a vessel to any desired location. An electric motor operates the various pumps, propellers, drills, etc.

The air supply system is arranged more or less on the lines adopted in submarines, an air tank being installed in the apparatus of two-men-supply capacity. Two propellers in the rear and bottom of the machine give navigation direction at will. Light is furnished by six 3000-candle power nitrogen lamps. Electric current and telephone communication are furnished by a cable between the tender and the machine. The pontoons employed as adjuncts are of corrugated steel, about 15 feet in diameter by 40 feet long.

Circumstances and location will, of course, determine many details of application and of the device in practice. In general, however, it may be

said that having ascertained the approximate location of a sunken vessel, the machine is lowered overboard from the tender, following which, by means of its propellers, search is made in the immediate vicinity for the exact position of the wreck and determination of its physical status. These preliminary problems having been satisfactorily solved, the pontoons are next lowered into position. Drilling of the hull for holes in which to insert the lifting-hooks is the next operation. The pontoon number and capacity will vary with the weight and dimensions of the vessel to be raised. However, it is hardly possible to imagine a case of possible salvage where the requisite pontoon number and capacity would be inapplicable. It should be stated here that the pontoons are water-filled when being submerged, the water being emptied out by internally-contained motor pumps when the actual raising is in process.

One diving unit is reported to be some 95 per cent complete at the company's shops and arrangements are in progress with a view to having it employed for the recovery of sunken vessels this coming spring. The views accompanying this article and the data given above have been supplied by the American Salvage Co., 115 Broadway, New York.—*Shipping, 2/2.*

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Vulnerable Parts of Fighting Ship.

INTERNATIONAL NOTES

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NAVAL WAR NOTES

PREPARED BY

LIEUTENANT W. B. JUPP, U. S. Navy

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STRATEGY

ALLIES AND U. S. BEGIN SUPREME WAR COUNCIL.—Great Britain, France, Italy and the United States were represented at the session of the supreme war council which was convened at Versailles, France, January 29, presided over by Georges Clemenceau, the French premier.

The meeting is regarded as one of extraordinary importance, because the plan of operations during the coming campaign is expected to come before it for determination.

The United States was represented by General Tasker H. Bliss, Chief of Staff of the American Army. Arthur Hugh Frazier, Secretary of the American Embassy at Paris, attended as a diplomatic officer, to report the proceedings, but not to participate otherwise. The other participants in the conference were:

For Great Britain: Premier Lloyd George and Major General Sir Henry Hughes Wilson, subchief of the British General Staff; for Italy: Premier Orlando, Baron Sonnino, the foreign minister, and General Cadorna; for France: Stephen Pichon, the foreign minister; General Ferdinand Foch, Chief of Staff of the Ministry of War, and General Maximo Weygand.—*Evening Star*, 29/1.

SHIPS POOLED TO HASTEN AID TO ALLIES.—*American, Allied, and Neutral Vessels Under Board of Three.*—Centralized control of transatlantic shipping was established recently with the creation of a Ship Control Committee to have supreme charge of the operation of all ships—American, allied and neutral—entering and leaving American ports.

The committee was named by representatives of the Shipping Board, the War and Navy Departments, the Food and Fuel Administrations, the Director-General of Railroads, the British Government and ship-owners, who met to devise some plan for speeding up the movement of supplies to Europe. It comprises P. A. S. Franklin, of the International Mercantile Marine, chairman; H. H. Raymond, head of the Clyde and Mallory Lines, and recently made Shipping Controller at New York, and Sir Connop Guthrie, director of British shipping in this country.

The arrangement, as explained by Shipping Board officials, in effect creates a pool of ships moving supplies to Europe. Goods destined for overseas will be loaded in available ships, whether operated by the United States or the allies. With the aid of the Railroad Administration the committee will divert to southern ports much of the supplies that heretofore have clogged the port of New York, and incoming vessels will be directed by wireless to proceed to the ports in which materials of the most importance await shipment.

The plan yet has to be approved by the British Government and by the other allies, but officials have received the assurance of Sir Connop Guthrie and Sir Richard Crawford, of the British Embassy, that this would be forthcoming.

Approval of the neutrals is not necessary, inasmuch as neutral ships operated by the United States and the Allies are operated under charter. The British long have urged an arrangement of the kind, and months ago sought to have the United States enter the inter-allied chartering conference. The centralized control now authorized virtually creates such a conference on this side of the water.

Shipping experts here have expressed the belief that at least 30 and perhaps 50 per cent greater efficiency could be obtained from the shipping at the disposal of the United States and its allies by close coordination of effort. Great Britain's shipping, it was stated, represented about 80 per cent of the overseas service.

In a general way, the British Government's shipping will be used to carry foods in quantities sufficient to meet the emergency conditions abroad. The United States will endeavor to get the men across and supply to them the necessary arms and ammunition.

The direction of all this tonnage, American and allied, will come under the jurisdiction of the council of which Mr. Franklin is the head. The War and Navy Departments and the Food and Railroad Administrations will not have representatives on the council, as it is intended to concentrate power for action in a small body. Agents of these departments, however, will work in the closest cooperation.

There will be representatives of the new council in all of the important American ports, and agents will be sent also to France, England, and Italy. By the use of the cables the men at the helm here will be kept in constant touch with all developments.

One of the first problems to be taken up will be quick routing of vessels, which often have been delayed for many days because of a division of power in their direction. Arrangements will be made so that ships will know in advance and definitely the place where the convoys are to meet them and the time they are expected to be on hand. Orders in this connection will be applied to American and allied ships and will be mandatory. It is said that there has been much confusion and delay in the past.

Incoming ships will be informed in advance also of the ports at which they are to land, thus doing away with the delays which have been caused by vessels arriving at docks already overworked. Outgoing vessels will be instructed where to get their bunker coal and cargoes.

Where it is found essential cargoes of foodstuffs may be sent over the transportation lines of the nation to southern instead of northern ports, and ships receiving directions from the new council will call at such ports when instructed, even if the overseas course thus allotted to them may be longer. The shipmaster will have no right to use his discretion in such matters under the proposed system of control.

In fact, it is intended to give to the Shipping Control Committee practically absolute power over the employment of tonnage, with the single proviso that there will be no effort in the direction of fixing rates for the allied as well as the American tonnage.

Activities will not be restricted to this side of the Atlantic, as much work will be done in the development of port facilities in Great Britain and France to provide for the rapid unloading and loading of vessels.

Mr. Franklin will spend most of his time in Washington and will keep in close touch with Edward F. Carry, director of operations of the Shipping Board and the various departments involved. Mr. Raymond will establish headquarters in this city.

Raymond B. Stevens, vice-chairman of the Shipping Board, and George Rublee, of the board's legal staff, are to be sent to London as permanent representatives of the Shipping Board.

Mr. Stevens will take his place on the Inter-Allied Chartering Executive, which sits at London and Paris and has control over all British, French, Italian and neutral tonnage operating under charter to the Allies.

The Shipping Board is understood to have under consideration several shipping men for the posts of representatives of the Division of Operations at London, Paris, and Rome.

Robert P. Bass, former governor of New Hampshire, and a labor expert, who has been assisting Mr. Stevens in dealing with labor problems, will take over such of the vice-chairman's duties as have to do with labor, it was learned. Whether one of the four remaining commissioners will be appointed acting vice-chairman during Mr. Stevens's absence could not be ascertained.—*Nautical Gazette, 1/2.*

ALLEGED SUCCESS OF CONVOY SYSTEM.—The *Pall Mall Gazette* recently published an interview with Sir L. Chiozza Money, Parliamentary Secretary to the Minister of Shipping, on the question of ships and food.

Referring to the effects of the U-boats, Sir Leo remarked that the rate of our losses had fallen so greatly since the spring of 1917 that it is quite certain the enemy cannot beat us or starve us by a submarine campaign.

Regarding the convoy system, he said the public hear only of quite exceptional cases of loss without knowing what excellent results have been achieved. As regards homeward convoys, I have here a list of 186 homeward convoys, concerned with no fewer than 2430 ships, carrying no less than 17,500,000 tons of cargo. And what was the loss on the whole? Almost exactly 1½ per cent.

As to food ships, so well have they been cared for that the recent losses, including the exceptional cases to which public attention has been directed, have been exceedingly small. In the last few months, for example, scarcely any of the wheat homeward bound to the United Kingdom has been lost by enemy action. But no one, added Sir Leo, should find excuse for waste in that statement, for, as has been said, the cumulative effect of past losses remains. Further, we have, unfortunately, had to divert food cargoes from the United Kingdom, France, and Italy.

If, therefore, I tell you, added Sir Leo, that the convoy system has been a magnificent success, I say no more than the truth, but that success does not put us back to the position we occupied before the serious losses began. Only new building by Britain and the United States can do that, and it will be some time before that building tells and raises the aggregate tonnage position of the Allies.

Commenting in its issue of January 14 on the above interview, the Liverpool *Journal of Commerce* comes to the conclusion that Sir Leo's figures are misleading. In part it says as follows:

A week ago Sir Leo Money is reported by the *Pall Mall Gazette* as saying:

"The public hear only of quite exceptional cases of loss without knowing what excellent results have been achieved. As regards homeward convoys, I have here a list of 186 convoys concerned with no fewer than 2430 ships carrying no less than 17,500,000 tons of cargo. And what was the loss on the whole? Almost exactly 1½ per cent."

Observe the "no fewer" and the "no less," for we are inclined to the opinion that Sir Leo indulges in exaggeration when he wishes to appall

us by the immensity of the figures with which he dabbles. A week later he is reported by the *Daily Mail* as saying:

"Or consider the success of the convoys. The last report which has just reached me shows that over 18,000,000 tons deadweight have been convoyed with a loss of only 1.52 per cent. Or, take all inward cargoes. In the last four months the loss has been only about 3 per cent, of which only about 1 per cent is represented by food."

Sir Leo Money does not state that "the list" quoted in the *Pall Mall Gazette* is one and the same as the "last report" quoted in the *Daily Mail*. However, he speaks of 2430 ships carrying 17,500,000 tons of cargo, which he works out at 7200 tons per ship, and if he is sincere in his utterances he would speak of an average convoy of average ships, with the average deadweight capacity of 7200 tons. If we apply such figures to all inward cargoes in the last four months we find there is something wrong, else our figuring is not what it should be. During September, October, November, and December, there were 43,438 arrivals at British ports, according to the weekly returns issued by the Admiralty, and on an average carrying capacity of 7200 tons we have a total of 312,753,600 tons brought to this country. Obviously, this is wrong. Its ridiculousness is apparent on the face of it, and at the same time Sir Leo's own figures help to disprove it. He says "the loss has been only about 3 per cent," which represents 9,382,608 tons, or 1303 vessels. Yet the total of sinkings, out of arrivals and sailings, reported by the Admiralty in the same period is 311 vessels, of which 222 were 1600 tons gross and over, and 89 under 1600 tons. There is something wrong.

Again, he says 2430 vessels were convoyed with a loss of only 1½ per cent, that is, 36 vessels. (Again we say we do not know whether "the list" quoted in the *Pall Mall Gazette* is one and the same as the "last report" quoted in the *Daily Mail*.) A simple proportion arithmetic calculation tells us that if 36 vessels are sunk out of 2430, then proportionately 644 would be sunk out of the 43,438 arrivals during the last four months. But we are officially advised that there were only 311, and the deduction we draw from Sir Leo Money's illustration is that the proportion of sinkings is exceedingly high in the convoys. If 311 is the total sinkings, then proportionately only 18 should have been lost out of his convoys.—*Nautical Gazette*, 7/2.

THE WAR AT SEA.—The following is the first sentence of a leading article in the *Army and Navy Journal* of New York for December 8, 1917:

"From statements made by the navy authorities of France, England and the United States in the last few days it would appear that the long-looked-for more aggressive naval policy on the part of the Allies was in sight."

It has long been apparent to those who read the American professional journals and the expressions of opinion which have appeared from time to time in other American papers that the view was held very generally on the other side of the Atlantic that the naval policy of the Allies was susceptible to improvement. While praise was lavished on the officers and men of the British Navy and its auxiliaries afloat for their gallantry, endurance and technical skill, it was suggested that while the fleet was under the control of politicians suddenly called upon to face the problems of war in a serious way and insufficiently equipped for the purpose, it was unlikely that the very best use would be made of it. The United States, like this country, describes its navy as its first line of defence, but it has learned also the potency of its fleet as an offensive weapon. Like this country before the war, it possessed only a small but highly trained professional army, which on occasion it had used as the spearpoint of its naval forces. Although, then, when the United States came into the war, measures were taken to increase the land forces, it was to the navy that the nation looked primarily to assert its strength on the side of the Allies. Mr. Daniels, the Secretary of the Navy, in his annual report recited the steps taken by his department to cooperate with the fleets of the Allies,

and described the frank and free interchange of information which in the conduct of the naval war was a proof of "the partnership of democratic nations which will yet ensure a lasting peace."

The decision to create an Allied Council composed of the high naval officers of all the allied powers has been regarded as a significant sign of a change in policy more in accordance with this American view. This belief was held to have support in the statement made by Mr. Daniels on December 5 that "there is to be the greatest possible measure of cooperation between the American and allied navies. The plan is to get the highest degree of efficiency out of our naval forces wherever they may be needed." It has been admitted by the changes which have been made during the past year that a weak place in our Admiralty organization was the Operations Department, and among the measures which have been taken to strengthen this department Sir Eric Geddes has mentioned an infusion of younger officers with recent experience afloat. If, then, the *Army and Navy Journal* is justified of its surmise, the new policy will have as its sponsors not only the French and American professional writers who have pressed for it, but the young British naval officers with war experience, whose opinions after all must appeal more strongly to their countrymen.

It is not proposed to speculate here as to the form and substance which this more aggressive policy will take. Commenting on the appointment of Sir Rosslyn Wemyss, the *Times* said "our younger seamen are convinced that they can entirely overcome the submarine peril if they receive the free hand which they have never yet been granted," and the *Daily Mail* said of the new First Sea Lord that "his record suggests that young and energetic officers will find a more open path to promotion and greater opportunity of making good than was ever the case under the old régime." Obviously, there is here pointed out one direction in which offensive policy may make itself manifest. The *Westminster Gazette* also on this point says, "the younger school will be well advised if, with the experience of their predecessors behind them, they refrain from making promises and restrain their sponsors from promising on their behalf. What their plans are they will rightly keep to themselves, but their main defensive task is still to grapple with the submarine and to bring all their wits to bear upon mastering as well as holding that peril." On the other hand, the American *Journal*, which has been already quoted, looks further afield. We are told, "opinions have been advanced in Washington that the logical developments of the formation of the naval council are that either the American naval forces abroad will be sent to the Adriatic to join in a combined attack on the navy and naval bases of Austria, or that the Naval Council will control the merchant fleet of the Allies, and to our ships will be entrusted the entire task of convoying them." This is the kind of speculation which British writers and publicists are not prone to indulge in. It can serve no good purpose. More to the point it is to say that there is no likelihood whatever of "a younger British school," or the allied naval authorities conjointly, undertaking any risky adventures or ill-conceived "gambles," because our naval forces have now been reinforced by those of the United States.

That the strategy of a naval offensive can be pushed without incurring risks is absurd, and if there are any who believe that Admiralty reconstruction is going to prevent entirely mishaps, such as that to the three destroyers, or an occasional successful attack by the enemy on a convoy, they will assuredly be disillusioned before long. The public should bear in mind that not every German adventure turns out a success, and it is silly to describe every British mishap as a disaster or a catastrophe.—*Army and Navy Gazette*, 5/1.

CHIEF OF STAFF WILL REPRESENT ARMY ON SUPREME WAR COUNCIL.—General Tasker H. Bliss, chief of staff, who arrived in Paris to-day, will represent the United States Army on the Supreme War Council. Secre-

tary Baker in so announcing disclosed that the general is accompanied by high officers of every branch of the service to advise him about any question that may arise.

General Bliss attended the first meeting of the council and decision to send him back to Europe as a permanent representative in that body was made because it was recognized that General Pershing's duties in organizing and commanding the ever-increasing American Expeditionary Forces were too great to permit him to undertake the presentation of American views on military operations and to sit with the council in framing plans of strategy that cover all fronts and all armies.

No word of the departure of General Bliss had been published until the news of his safe arrival came.

From General Bliss the War Council will obtain an up-to-the-minute report on what the United States will be able to contribute to operations on the western front this spring and summer. His report in this regard has been forecast to some extent by President Wilson's statement to Congressional visitors that there would be in Europe in June twice the number of American troops which it had been originally planned to send by that time.

General Bliss also can inform his conferees exactly the situation in which the United States finds itself now as to delivery of supplies of all sorts to the Allies, and this information probably will have great weight in the shaping of war plans.

While Secretary Baker's statement merely said that General Bliss had arrived in France to represent the army on the council, there have been intimations that renewed recommendations for vigorous offensive operations on the widest possible scale were included in the instructions the general received before sailing.

Probably the primary consideration before the council when it reconvenes will be the widely advertised proposed German offensive on the western front. A mass of information has reached the allied powers from many quarters indicating an impending drive against the British or French lines, or both, which will be carefully reviewed.

The possibility suggested by Colonel Repington, the British military critic, in his initial article in the *London Post* to-day that the "German concentration may be to support negotiations" rather than for an assault is in line with views held by some American officers here. They feel that had Germany really intended to make a great drive she would not have given advance notice of it and are inclined to the opinion that the German high command is endeavoring to set up the bogy of a great attack as a preliminary to another peace drive.—*Baltimore American*, 24/1.

MINES PLAYING BIG PART IN WAR AT SEA.—*Hunting and Dragging Bring Wireless and Aircraft Into Service.—How Germans Lay Them.*—With the exception of the few general naval engagements which took place early in the war, sea warfare has consisted almost entirely of submarine attack and defence, along with mine laying and mine dragging. The warfare of mines has developed enormously during the last year, until its importance almost equals that of submarine warfare. At present it is a race to determine whether the Allies can drag the mines faster than the Germans can manufacture and lay them. Usually the Allies are able to keep the sea lanes clear, and sometimes the Germans manage to plant their mines in a position to keep several sea lanes blocked.

Almost invariably the Germans lay their mines from shallow draft mine-laying submarines, that carry but a few torpedoes, besides their eight or a dozen mines. These minelayers operate under cover of darkness, laying a string of heavily charged mines diagonally across the channels, often forming a double barrier to the sea route. Besides mining the channels at the entrance to important ports, the minelayers sow their charges off the coast along routes usually taken by convoys.

The Germans have concentrated their minelaying in a few regions—Saloniki, Malta, where one British officer dragged more than 200 mines; certain Italian ports; a few parts of the English Channel, the southern Irish sea, the eastern English coast and the Atlantic ports of France.

Before dragging the mines they must be located. This is done by means of a complete series of reports from all kinds of air and sea craft. Seaplanes, airplanes and scout dirigibles explore the channels and sea lanes whenever atmospheric conditions permit and especially ahead of each convoy. And to this group has been recently added the captive balloon, towed by a patrol boat. Hundreds of mine fields have been located by these means.

The aircraft, when a ship is running toward a newly discovered uncharted mine field, drop messages attached to cylindrical floats, which are picked up by the ships. However, especially at this season, the weather is prohibitive of good aerial patrol work.

Sometimes mine fields are discovered in ways that thrill. Several patrollers have seen mines at low tide in the trough of an extra large wave. And the patroller crews know enough of the mine's possibilities to fear it. Another costly but sure indication of the presence of a mine field is the blowing up of a ship. Often this is the first warning that the enemy has passed that way.

By wireless from the aircraft and the sea patrollers; by semaphore from the coast defence stations and by the detailed reports of each vessel that touches port, the locations of the mine fields are forwarded to the staffs of the different navies. Regularly published maps spread the news broadcast to warn all ships until the mines can be dragged and the dangerous channels and sea lanes once more thrown open to navigation.

Channel dragging is comparatively simple, because the space to be cleared is well defined and the proper moment can be chosen. Conditions of tide, wind and fog are not so important.

Off shore dragging, on the other hand, is very difficult for many reasons. In the first place, the exact location of the mine field is rarely known, hence an enormous area must be dragged in order to be sure that all the mines have been discovered. Sometimes aerial observers have seen "moons" and have reported them for mines. "Moons" are large round fish that have caused a lot of fruitless dragging.

Once the definite location of the mine field is known, the dragging can proceed quite accurately and rapidly by obtaining two points on shore. This is usually possible, since the mines are rarely laid in over 75 fathoms of water. Foggy weather obscures the landmarks and prevents dragging.

If the wind is high and a heavy sea is running it is impossible to drag, partly because of the danger of dropping on a mine in the trough of a sea and partly because of the impossibility of exploding or sinking the mines when the shears cut them loose. A drifting mine is a menace to friendly and enemy ships alike.

Conditions of the tide must likewise be considered for the angle given the mine cable; a strong tide would oblique the cable and hinder dragging.

Once at sea the Germans cannot touch their mines, because they are stored in compartments, opening at the bottom of the submarine. A pin is pulled out when over the channel or route to be mined and the mine falls of its own weight. When the mine hits the ocean floor the cable is released and the anchor, usually of the mushroom type, grips the bottom. The mine rises to the surface until a hydrostatic valve stops the unrolling of the cable. The desired distance is about 12 feet below the surface of the water.

Often the Germans make mistakes in setting the hydrostatic valves. Air pressure is considered, but this changes between the time the minelayer leaves port and arrives over the area to be mined. Also, if the mines are dropped in a fast tide, they rise in an oblique line until the valve stops them when at the desired depth. Later, at slack water, the mines rise very near, or even to, the surface, where they are readily seen.

In the near future I hope to see some mines cut loose from their cables; to see them jump partly out of water; to see a well directed rifle shot from the little yacht break one of the four antennae surmounting a mine, thus causing the upheaving cataclysm following the explosion of 310 pounds of trinitrotoluol.—*Evening Star*, 28/1.

BLAMES VON TIRPITZ FOR U-BOAT FAILURE.—An article attacking the submarine warfare, which was suppressed by the German censor last October, has now been published "with the sanction of War Minister Von Stein" by the *Kiel Zeitung*. The article was written by Dr. Struve, a progressive member of the Reichstag, who asserts that the submarine war is a failure, and discusses at considerable length "who was responsible for the unrestricted submarine warfare agitation and for the statement that England could be forced to her knees within six months."

Dr. Struve asserts, after quoting a variety of witnesses, that the whole agitation was conducted and engineered by Admiral von Tirpitz after the latter's retirement. The article then develops into an attack on von Tirpitz and the new Fatherland Party for "getting Germany into this difficulty," and closes with the assertion that the submarine warfare might have been a success except for the fact that von Tirpitz, while in office, had neglected to build submarines in sufficient numbers to insure success.

"That was the reason," adds the writer, "that unrestricted submarine warfare was always opposed by von Capelle, Minister of the Navy, and the Imperial Chancellor, von Bethmann-Hollweg."—*Evening Star*, 9/2.

THE PROPOSED U-BOAT DRIVE.—Neither the Allies nor the United States are deceiving themselves as to the U-boat situation. And the United States knows well that it may expect this present year a drive of the submersibles against the Mexican coast points, for once it is seen that the war must be carried into the breakdown of Germany—that country will make a desperate effort to have the United States pay the cost of its entrance into the strife as heavily as possible.

Such is the outlook for the coming months. And the government, with its patrols and its nets and other measures will be quick and alert to offset the plans of the Germans and to frustrate their raiders. At any rate the fact remains that the menace of a tremendous drive of the submersibles on this side the water, as well as the other, is apprehended. The most momentous drive on land and seas that the world has ever seen in military and naval action is the standard of probability that the United States military authorities, in combination with those of its friends abroad, are taking as the standard of full preparation.

Either peace or the worst chapter yet of the war is the outlook—no one can doubt which.—*Baltimore American*, 29/1.

LESSONS OF THE WAR

THE UNARMORED BATTLESHIP.—*Tendency is Toward High Speed, Great Gun Power, and Large Displacement.* By Commander Yates Stirling, U. S. Navy.—Until quite recently, the evolution of the battleship was based almost solely on the power of the gun, for the danger of the torpedo from a surface craft was being discounted. Battleships strove to carry sufficient thickness of armor to prevent shell penetration. Those nations who built their battleships with internal underwater armor reckoned only with a moderately heavy torpedo war head. That such underwater protection is wholly inadequate can be readily understood when it is remembered that a torpedo war head is now used which contains nearly 500 pounds of the highest explosive known. This is nearly double what was used at the commencement of the war.

The present-day battleships or the superdreadnoughts, as they are called, are fairly adequately protected from gun fire by their great weight of armor—

The maximum speed of the battleships is but little greater than that of the latest submarines. A battleship requires probably more than half an hour to go from its cruising speed to its maximum, while a submarine can be going at its highest available surface speed within a few minutes. A submarine can sight a battleship at a distance of about 25,000 yards or 12½ miles. A battleship can recognize a submarine in the awash condition at no greater distance than 5000 yards or 2½ miles. A submarine, on sighting an enemy ship, would immediately sink to as near the water as possible, in order to avoid detection, for a submarine, when silhouetted against the sky, can be recognized a long distance away.

If the battleship's course heads through the tactical area of the submarine, there is almost the certainty of destruction involved for the big ship, unless it is accompanied by numerous anti-submarine craft.

The control of the surface of the sea is an important factor in the command of the sea. To control the surface, gun power, coupled with high speed, is essential. To gain high speed, retaining gun power at a maximum, armor must be sacrificed. The evolution of the dreadnought battleship of 21 knots speed was shaken to its foundation when the submarine reached its present state of offensive development. England and Germany both realized this shortcoming in speed when they laid down, respectively, the *Queen Elizabeth* of 25 knots and the *Ersatz Kaiser Friedrich* of 23 knots. Although data is not available, armor protection was probably sacrificed for the added speed. Each nation aimed at the control of the surface.

The logical development of the *dreadnought* battleship is towards the maximum number of the largest caliber guns with the highest speed attainable on the displacement permitted by other circumstances. The *cruiser* development seems to be toward guns of larger caliber than that carried by a contemporary battleship and with higher speed for the purpose of outranging the battleship. The battleship probably will retain some armor, but when it finds itself outranged by its enemy and without the speed to force a closer action, it too must eventually sacrifice all armor for gun power and speed. Thus, the development of these two types, the dreadnought and battle-cruiser, appears to be toward an amalgamation.

From the very nature of the problem of defence of our shores we require a type in which must be combined great gun power, large cruising radius and high speed. We should be able to hold possession of our own waters. It does not suffice for our fleet to meet an enemy on or near our coast line: we must meet him beyond in order that our peace lines of communication may remain unmolested. This principle holds for every type of warship.

Barring England and Mexico, an attack upon the United States, in its initial stages, must be conducted in many vessels across many miles of sea. In the event of war, therefore, with an enemy across the sea, our first duty will be to gain touch with his attacking expedition as far from our coast as possible and convenient in order to harass and eventually annihilate it. Slow battleships seem to have no place in our "attacking" fleet. We should have types capable of "controlling the surface" from our shores to the advancing enemy. By this means we shall lessen, if not eliminate, the danger of enemy submarines, and give our own mobile offensive type of submarines an added value. Gun power, radius of action, and speed are essential for this work. These are the pivotal attributes. To gain them, all purely defensive attributes will have to be sacrificed.

Every nation must eventually reach a maximum limit of displacement, which it would be ruinous financially to go beyond. In our case this limit is for all times fixed by the size of the Panama Canal locks. These locks have the following dimensions:

Length	1,000 feet
Width	110 feet
Depth	40 feet

guarded warships, the torpedo has shown itself, in the present war, to be a surprisingly ineffectual weapon. Thus, in the battle off the mouth of the Elbe, lasting several hours, in which some 50 to 60 ships, all heavily armed with torpedoes and using them very freely, were engaged, not a single torpedo hit, if we remember rightly, was reported on either side. Even more significant is it that in the great battle of Jutland, in which over 120 ships were engaged, and the destroyer flotillas were exceedingly active, only one torpedo hit was made on the whole of the British fleet, which must have included at least 70 to 80 vessels of every type. The battleship *Marlborough* was struck near the stern and listed rather heavily; but she was able to bring herself back to a level keel and continued the fight.

High speed and quick turning power have proved to be the best defence against the torpedo. The fast battle-cruisers and scouts are well able to take care of themselves and the slower battleships are protected by numerous screens of destroyers, each flotilla being led by a fast light cruiser, carrying heavy torpedo defence guns, of from 4- to 6-inch caliber.

The failure of the torpedo to get in very much effective work against naval vessels is not due to the inefficiency of the torpedo itself; for the torpedo is indeed a wonderfully efficient weapon. It is stated that our latest 21-inch superheat torpedo will travel with marvelous accuracy for 10,000 yards at a speed of between 30 and 40 knots. Target practice with these weapons, in time of peace, has proved that it will do this consistently; but target practice conditions, when the target is stationary or moving at a comparatively slow speed, and conditions in a sea fight, when the enemy's ships are moving at from 20 to 35 knots, are two very different propositions.

The failure of the torpedo against warships is not due to the weapon, but to the human element—the great difficulty of estimating the distance, speed, and course of the enemy's ship. This is so far recognized in battleship tactics, that no attempt is made to fire the underwater torpedo tube of a battleship against the individual battleships of the enemy's column. The torpedoes, should the two fleets come within torpedo range, say 10,000 yards or less, would be discharged against the enemy's line as a whole, on the chance that while many of the torpedoes would pass between the ships, others would score a hit. The modern warship is about 200 yards long and the interval between the ships is about 500 yards, if they are keeping proper station, so that theoretically two out of seven torpedoes should hit the mark.

It is extremely difficult to hit a fast ship at a distance of 5000 to 10,000 yards. Thus, a 700-foot battle-cruiser going 30 knots will cover a distance equal to her own length in 14 seconds, whereas it will take a torpedo of the latest design at least eight minutes to reach a ship 10,000 yards away. Now a 30-knot ship, moves at the rate of 50 feet per second, and hence it is necessary for the torpedo officer to estimate very closely the distance of the ship and the speed at which she is traveling, before he can determine how far ahead of the position of the ship he must aim his torpedo if ship and torpedo are to meet some minutes later. If he estimates the ship is traveling 30 knots, when she is traveling only 25, and calculates the course of his torpedo accordingly, the torpedo will reach the proposed meeting point too soon and will pass ahead of the ship. Vice versa, if he estimates she is traveling 25 knots when she is really going 30, his torpedo will arrive too late and will pass astern of the ship.

How difficult these calculations are is proved even in the attack by submarines at close range on slow-speed merchantmen: for many times during the past two years it has been recorded by the officers and crew of such ships that torpedoes have passed ahead or astern of them.

In spite of its visibility, the 30- to 35-knot destroyer, carrying from 8 to 12 torpedo tubes, is the most effective means for torpedo attack. The work is hazardous, of course, but several flotillas of these craft, rushing down upon the enemy at 35 knots, particularly if they are protected by a smoke screen, are very likely to get a battleship or two, even though several of them are disabled or sunk by gun fire.

The smoke-screen or smoke attack, which has been used so frequently and effectively in this war, originated in the United States Navy, being first used in our destroyer fleet, when it was under the command of Captain Eberle. The writer well remembers being present at such an attack off Block Island several years ago, when five groups of destroyers, 20 in all, crossed the head of a column of battleships, until they were in the windward position, and then, with the leading destroyers smoking heavily, swept down the line of the enemy at a distance of about 1300 yards. The pall of dense smoke rolled down to leeward, enveloping the enemy and screening the destroyers from observation; but above the dense and low-lying bank of smoke could be seen the successive pairs of fighting tops of the battleships; and, had the maneuver been an actual battle, some of the capital ships would have been heavily torpedoed.

In the battle of Jutland, the German destroyers made use of this smoke-screen as a protection to their own battleships, when they were being heavily hit by the battleship divisions under Admiral Jellicoe. A noticeable feature of that fight was the use of fast 30- to 35-knot light cruisers, armed with 6-inch guns, as leaders of the destroyer flotillas. One well-placed shot from a 6-inch gun will usually cripple a destroyer, if indeed it does not sink her, and the object of these light cruisers is to lead the attack, break up the counter-attack of the enemy, and bring her own destroyers within torpedo range.—*Scientific American.*

PRESIDENT WILSON ON THE FREEDOM OF THE SEAS.—In the course of his masterly address before the House and Senate, setting forth the fourteen terms of peace for which we are "willing to fight until they are achieved," President Wilson stated that the United States stands for "absolute freedom of navigation upon the seas, outside territorial waters, alike in peace and war, except as the seas may be closed in whole or in part by international action for the enforcement of international covenants."

Now, this, the true freedom of the seas, is a very different matter from the freedom of the seas which Germany is seeking to bring about.

We stated in our editorial upon this subject, last week, that Germany has never given any clear statement of what she intended by the phrase; and it is certain that no formal definition has ever been made by the German Government.

But although the government, for obvious reasons, has been silent, one of Germany's leading naval and military critics, Count Reventlow, has declared his interpretation of the phrase in terms which remove the last vestige of doubt as to what he and, it is reasonable to suppose, the German Government has in mind. For Prof. Selfton Delmer, who was present at a mass meeting in Berlin last March, when the Count lectured on war aims, has recently supplied the *Daily Mail* with a translation of certain passages from the address, which leave no further doubt as to the manner in which Germany interprets the "freedom of the seas."

Attention is drawn to this translation in an article contributed to the *Naval and Military Record* by the well-known British naval critic, Hector C. Bywater (for many years a resident of Berlin) who quotes Count Reventlow as follows: "What do we Germans understand by the 'freedom of the seas?' Of course, we do not mean by it that free use of the sea which is the common privilege of all nations in times of peace, the right to the open highways of international trade. That sort of freedom of the sea we had before the war. What we understand to-day by this doctrine is, that Germany should possess such maritime territories and such naval bases, that at the outbreak of a war we should be able, with our navy ready, reasonably to guarantee ourselves the command of the sea. *We want such a jumping-off place for our navy as would give us a fair chance of dominating the seas and of being free of the seas during a war.* The inalienable possession of the Belgian seaboard is therefore a matter of life and death to us. Our aim must be, not only to keep what

our arms have already won on this coast, but sooner or later to extend our seaboard to the south of the Straits of Calais."

So here, at last, the truth is out. The freedom of the seas is to mean freedom for the shipping of all the world until such time as Germany may see fit to declare war, when freedom of the seas is to become a German monopoly. Now, in view of the fact that this question of the seas is to figure so prominently in the terms of peace, whenever these shall come to be discussed, Count Reventlow has certainly done the world good service by thus so unreservedly letting the cat out of the bag.

"It is not the freedom," says Bywater, "but the absolute mastery of the seas that Germany covets, and scarcely a day passes without bringing new proof of this ambition." Thus in a recent issue of the *Deutsche Tageszeitung*, Count Reventlow made a vigorous demand for the full exploitation of the military successes in Italy. Austria-Hungary, he declared, absolutely needed the freedom of the Adriatic for her future development. "We confine ourselves to-day," he wrote, "to a general statement of our aims—that for the future an active Adriatic policy on the part of Italy shall be made completely impossible, and this, not by paper guarantees, but by real guarantees—that is to say, by appropriate territorial changes on the coast of the Adriatic." Evidently, the Teutonic alliance, if successful, intends to annex all the important strategic points on the Italian side of the Adriatic, and form a chain of bases that would enable its naval forces completely to dominate the Mediterranean. But Count Reventlow would not stop there. He would secure "two central points of power,"—the Adriatic and Constantinople with the Dardanelles. Such political, maritime and economic position would stand in the closest combination with the position of the German Empire in the Baltic and on the coast of Flanders. Says Bywater: "Here we have the same cynical avowal of the real aim that is disguised in the 'freedom of the seas' catch-word." With the Baltic a German lake, all the northern waters would be ruled by Germany; with the Flanders coast and the Pas-de-Calais ortified and honeycombed with naval bases, she would sit astride of every ade route converging on England; while from the strongholds of the driatic her raiders could issue forth to close the Mediterranean.

It is the command of the seas by the Allies that has saved the world om subjugation by the Teutonic alliance, and when the military and al power of Germany has been completely disrupted, and the various ipotentiaries assemble for the peace conference, this question of the eedom of the seas" must be placed on such a sure basis and secured a such rigid guarantees, that this dream of Reventlow and the Kaiser whom he speaks, shall be placed beyond any possibility, not merely of ilment but even of attempt.—*Scientific American.*

EXPERT CONTROL IN CONDUCT OF WAR.—Mr. Spenser Wilkinson, professor of military history at Oxford, and author of the article on "The Dardanelles" reprinted in the February PROCEEDINGS, has an interesting essay in the January *Nineteenth Century and After* entitled, "The British Constitution and the Conduct of War." His general thesis is that the governmental machinery established by the British constitution, while admirable in time of peace, has this weakness in war, that it fails to provide expert leadership and control of war departments and operations. In support, he notes the Marquis of Salisbury, speaking in the House of Lords at the close of the South African War:

> you will look back over the present century [he said—the nineteenth century] you will see there have been four occasions on which the British Government has engaged in war. On each occasion the opening of these wars was not prosperous. These were the Walcheren Expedition, the Peninsular War, the Crimean Expedition, and now the South African War. In all these cases at first—in the case of Walcheren not only at first—there were lamentable losses. . . . We cannot have been so unlucky

as to have fought four times and to have lighted upon the most incompetent and worthless ministers that the world has ever produced. It is evident that there is something in your machinery that is wrong."

Mr. Wilkinson points out that the executive branch of all governments, whether monarchical or democratic, consists of a set of ministers and a chairman, the chief difference being that in monarchies the king either holds the position of chairman himself or selects his leader, whereas in democratic systems the leader is selected by popular vote, either directly or indirectly through a legislative chamber.

Speaking in general, the most important member of this committee or cabinet in time of war is, in Mr. Wilkinson's judgment, "the designer of victory, the exponent of the general's art, of which success in war is the object. In many governments no such office is found among the ministers because the task is reserved for himself by the head of the government, the King or Emperor. Of some governments a commander-in-chief is a member, and in the United States the command of the forces is by the constitution vested in the President.

"Some representative of the art of war is always necessary, for every question of policy is in the last resort one of force, and the key, both to the avoidance of war and to success in it when it becomes inevitable, lies in the due co-ordination of policy and strategy. The mode in which that co-ordination must be sought is a conference between the chairman of the committee, the minister of foreign affairs and the strategist, on each occasion when any new departure is taken in external policy. At such a conference the foreign minister would explain the course he had to propose, the strategist would then say what it might involve in case of conflict.

"Throughout the course of a war the strategist is required by the government; for once the appeal has been made to force, by force the issue is decided. Yet nothing is so common in war as for persons of great influence to urge a government to scatter its forces for purposes not directly conducive to victory though thought in themselves desirable. Especially is this the case when the possession of particular places seems advantageous or likely to influence opinion at home or abroad. Few but trained strategists understand that in war everything can be had by victory but nothing without it; and that victory requires the concentration of all possible forces to strike a blow at some one point in order to destroy the enemy's fleet or his army. There seems to be no limit to the errors in the direction of fleets and armies that can be committed by governments in the deliberations of which the voice of strategy is silent, divided or overruled.

"The strategist is even more essential to a government than the minister who maintains the naval or military forces, for that minister must base his arrangements on the requirements of the fighting, of which the strategist alone can judge. The minister's presence in the governing committee is needed mainly in order that his financial proposals may be presented to the representative chamber with all the authority of government.

"In the case of a maritime state and especially of an insular power there must of course be two strategists: one for the navy and one for the army, for the mastery of both sea and land warfare is rarely combined by one man."

After a historical review of control of the Army and War Department in England in time of war, Mr. Wilkinson turns to the navy:

"In the epoch of Nelson and Napoleon, the action of the navy was directed by a board which represented the Lord High Admiral in Commission. Another board was entrusted with the duty of supplying the ships and stores which formed the material portion of the fleet. But before the beginning of the reign of Queen Victoria, these two bodies were amalgamated into one, which combined the functions of command and supply. The chairman of this Board of Admiralty was the First Lord, the Cabinet Minister, a political personage unacquainted with war. Its

other members were four Sea Lords, one or more Civil Lords and a secretary. The political chief, the First Lord, had power, with the concurrence of one other member of the board, to act in the name of the whole committee. In 1895 I ventured to criticise this arrangement by pointing out that it failed to provide the navy with a commander-in-chief for war, and suggested that the First Sea Lord should be made commander-in-chief and be given authority in peace and war to issue all orders for the distribution and movement of ships and fleets; that his should be the office in which should be prepared all orders to the admirals commanding squadrons or fleets, and that he should be selected on the sole ground of his strategical and tactical qualifications for this duty. These criticisms and this proposal were supported, for a few weeks only, by the Navy League, with the net result that the First Sea Lord was formally recognized by the government as its naval strategical adviser. But there was no consistent attempt to select a First Sea Lord on the ground of mastery of naval operations, and no attempt whatever to relieve him of the many administrative duties to which it was impossible he could properly attend if he really devoted himself to strategical problems and to the study of the operations of a future naval war. Mr. Churchill, indeed, on becoming First Lord of the Admiralty in 1911, created at the Admiralty an office akin to that of the chief of a General Staff of an army, but the head of this office was not made a member of the Admiralty Board, and occupied a comparatively subordinate position.

"During the course of the war there has been some slight development. The Chief of the Admiralty Staff has been brought into closer relation with the First Sea Lord, whose function as strategical director of the navy has been emphasized, though he still seems to be more deeply immersed in general administrative business than is consistent with complete concentration on the business of a strategical direction, which ought always, in my judgment, to be inseparable from his position. Authority without strategical insight must be expected to fail in war; for without the judgment produced by a life's study of the operations of war, no man can hope to solve happily the problems which war presents. But no insight will avail unless it is coupled with authority. A strategist who has not the power to have his solution carried out and put into execution is not a commander.

"The government has lately appointed a most distinguished administrator to be First Lord of the Admiralty. It is beyond doubt a wise move to appoint an administrator to be the head of the administrative business of the navy. And this, according to my reading of the lessons of history, would be best accomplished by reviving the distinction between supply and command. Command should be the function of the First Sea Lord; his should be the voice to explain in the cabinet his design for the conduct of the naval war; his the voice communicating that design to the naval officers afloat. If the administrator must also be a First Lord, it might conduce to a better understanding of his functions if he were to be called the 'First Shore Lord.'

"There are two delicate points which I have hitherto passed over. The first is, the place, in a geographical sense, of the commander-in-chief of either service. Should he be at the headquarters of the principal army or of the main fleet, or should he remain at the seat of government? I suggest that this should be left entirely to him. The modern facilities for movement from place to place and for the transmission of documents—even of considerable length—make it easy for a commander to communicate his views from one place to another.

"The great difficulty consists in the selection of men qualified for supreme command. To produce leaders is the chief function of national education; to discover them and to put power into their hands is perhaps the highest and the hardest function of the statesman. For there is no selection without rejection. The task is, however, less difficult in war than in peace because in war everyone understands the application of the precept 'by their fruits ye shall know them.'

"The general answer to the question raised by the title I have chosen is that the cabinet system is a machine suitable for the conduct of war, provided the cabinet is a council of heads of the great departments—under the presidency of the Prime Minister—and provided also that each minister is a master of the subject with which his department is concerned. Its efficiency is diminished in proportion as the members lack the necessary command of their subjects, and by the presence of members having no departments to supervise. Only the head of a department can be fully in touch with the problems that arise in it; and the opinion of a person deprived of that touch is apt to be in the nature of advice in the air.

"The story which I have told of the attempts of governments carried on during a quarter of a century to set in order the machinery for the direction of the army and the navy, illustrates what I believe to be the chief weakness of our national life—the want of faith in knowledge.

"The members of a government require more than ability; each of them requires a mastery of a subject, of the art or science upon which are based the activities of the office which he aspires to direct, and of its application. This mastery is to be had only through a long apprenticeship—the devotion of the best years of a man's life to the profession to which he is called. There are only two methods of forming a committee for governing a nation—for directing the nation's work. One is that hitherto practiced, by which a personage distinguished by party services, or by anything except mastery of the business which he is to superintend, is placed as Cabinet Minister at the head of a department, while its permanent chief, presumably the competent man, is made his subordinate, his adviser whose advice he may reject. This is government by incompetence. It has been accompanied by inefficiency and confusion and can lead only to defeat. The other method is to appoint as Cabinet Minister at the head of each department the most competent master of the work which that department has to do. The old wrong method was due to conditions which made the consideration of party all-important. It may be doubted whether, worked on that method, the constitution is as satisfactory as the late Lord Salisbury thought it for the production of happiness; assuredly it will never produce victory. But in war the mere thought of party is treason.

"Unless the spirit in which the constitution has been worked for the last 50 years is changed within the next six months, the constitution and those who have worked it will disappear in defeat and revolution. To-day the submarine and the aeroplane are telling all men that the alternative is between defeat and victory. Victory cannot be won by a government of amateurs. A government that seeks victory must begin by entrusting the conduct of the war to men who understand war."

DAZZLE SHIPS.—The following statement has been issued through the British Press Bureau:

"It has been stated at various times in the press that the Admiralty have not realized the value of camouflage as a means of assisting to defeat the attacks of enemy submarines on mercantile shipping, and that such camouflage as has been tried is not of British origin.

"It can be stated that the Admiralty are fully alive to its value, and several months ago a system of camouflage was originated. The principle governing it cannot be divulged at present, but it may be said that it has not invisibility for its basis.

"The theory of rendering ships invisible at sea by painting them various colors is no longer tenable; endless endeavors have been made in this direction, and numerous schemes given fair trial by the Admiralty under actual conditions at sea.

"The results of these trials have invariably been disappointing, and it has been finally established that, unless a vessel and her smoke can be rendered absolutely invisible, no useful purpose is served.

"The application of Thayers law is most commonly put forward as a means of obtaining invisibility. This, broadly speaking, is an adaptation of nature's means for eliminating shadows, and so reducing the visibility of birds and animals at close quarters, either for purposes of attack or defence, and it is stated that this can be applied to ships by painting the ceilings of promenade decks or other projecting structures white, in order to eliminate all shadows.

"Actual experiences at sea have proved that this is a fallacy, and that the paint itself being dependent on the light of the sky will not overcome shadows.

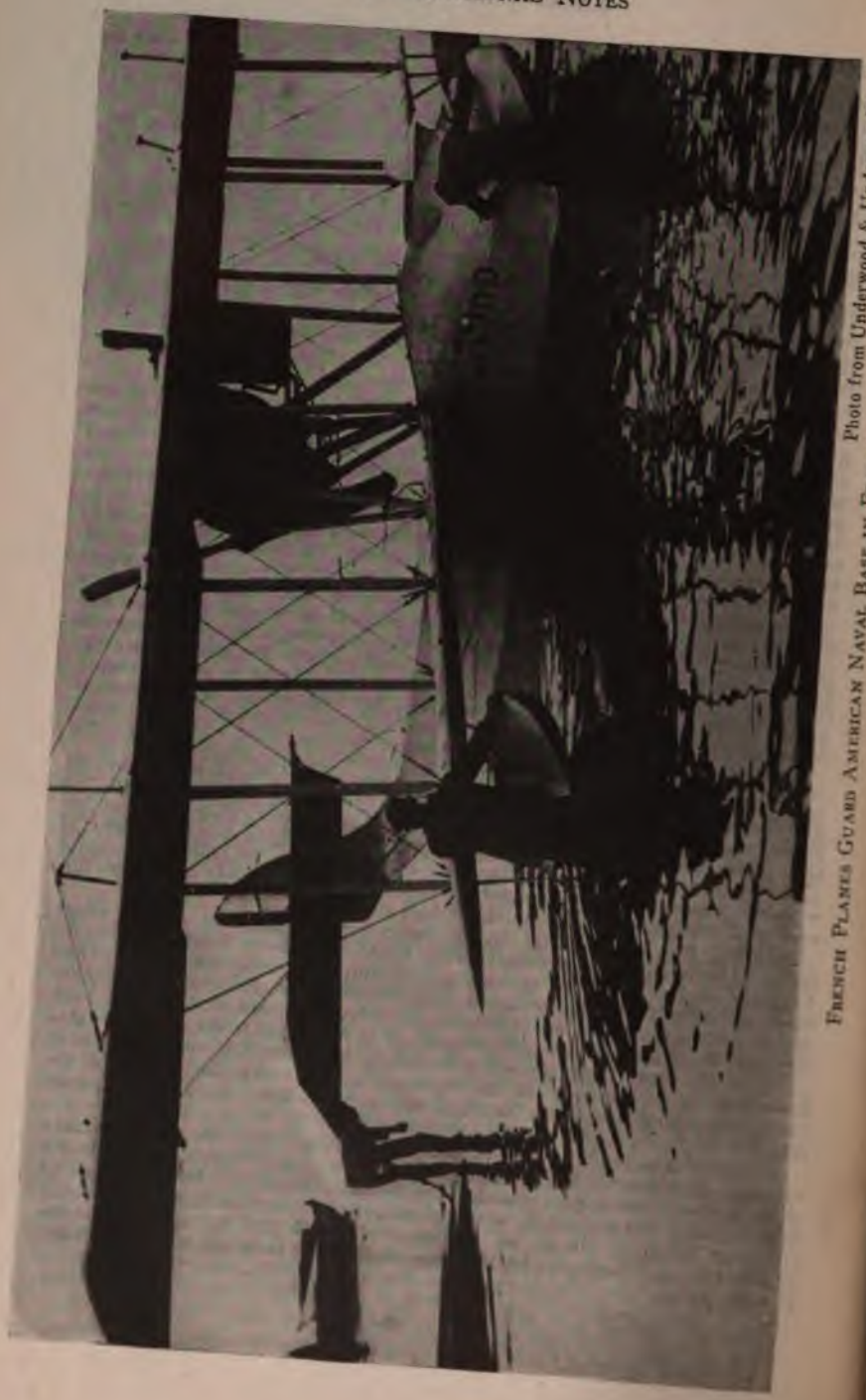
"The scheme now in use has been extensively taken up, not only by the British, but also by the allied governments, and no stone is being left unturned to utilize this important asset, which is only one of the many devices which are used to combat the enemy's submarine activity."—*Nautical Gazette*, 31/1.

THE NEED OF CONVOYS.—With the expansion of the shipbuilding program, it has become necessary for the naval authorities to take up the question of furnishing a sufficient number of convoys for the increase in vessels that will be available for oceanic transportation of troops and supplies. At present there is a deficiency in this type of vessel. For many years the Navy Department regarded vessels now suitable for use as convoys as of no special military value. They were useful, of course, in certain waters and on certain duties, but the policy of naval construction favored, instead, destroyers and capital ships so that the small cruisers and the gunboat were overlooked without anticipation of the great value and serviceability they are in this war. It is necessary, therefore, to provide ships of this type with the least possible delay in order to have them ready for service by the time a corresponding number of transports is available under the completing plans of the shipping board. These should be, it is represented, as of from 1500 to 1800 tons displacement, with speed of 16 knots.—*Nautical Gazette*, 31/1.

FAILURE OF THE WOODEN SHIP.—Rear Admiral Bowles, testifying before the Senate investigation of the affairs of the Shipping Board and the Emergency Fleet Corporation, was forced to admit that the wooden ship plan was a failure. His evidence completely vindicates General Goethals's stand, and proves that Mr. Denman's plan to build a thousand wooden steamships is absolutely impracticable, and that there is not enough lumber available to build the half of them.

Admiral Bowles said that, in his judgment, 90 per cent of the effort spent upon wooden ship construction could have been better utilized in building steel ships, which are much more quickly constructed than wooden vessels. Mr. Hurley's position is understood to be that the construction under contract of wooden vessels is far advanced, and that he will push through those already started, although it is certain that the United States cannot build more than 250 wooden ships in 1918, and it is very doubtful if they will be of any use for transatlantic service. All the efforts of the Shipping Board are being bent on the construction of fabricated steel ships.

It is now apparent that one of the principal causes of the unsatisfactory tonnage situation is Mr. Denman's adoption of thoroughly impracticable plans for wooden ships, on which, since the beginning of May, millions of dollars have been wasted, transportation systems taxed, and the labor situation strained all to no purpose, when, if the energies had been devoted to steel construction, the ships would now be in the water.—*London Times*, 31/12.



FRENCH PLANES GUARD AMERICAN NAVAL BASE IN FRANCE.

Photo from Underwood & Underwood, N. Y.

ATLANTIC

SIX U. S. SEAMEN KILLED BY FALLING FOREMAST ON THE U. S. S. "MICHIGAN."—Secretary Daniels gave out the following statement this morning:

In a heavy gale at sea on January 15 six men were killed and three injured on the U. S. S. *Michigan* by the falling of the foremast.—*Official Bulletin*, 17/1.

PATROL BOAT ON ROCKS.—An American patrol boat was to-day reported to the Navy Department ashore on a rock in European waters.

The vessel went ashore during a fog on January 25. There was no loss of life or injury to the crew. The vessel will probably have to be abandoned.—*Baltimore American*, 29/1.

LOSS OF THE ARMY TRANSPORT.—The first loss of an army transport has been mercifully lacking in a formidable casualty list. The place of the occurrence of the sinking of the *Tuscania*, while evidently a surprise, was accountable for the rescue of so many of those on board. The accident has failed to produce the sensation, while it has not failed to arouse public sympathy, expected of the loss of the first army transport en route to Europe. It has been felt that a dire disaster was needed to stir the people of this country to a realization that we were actually at war. It was appreciated that this would be an exceedingly heavy price to pay for securing the necessary national ardor and resentment against an enemy necessary to give support to the war. The successful attack by the German submarine in this case is probably only the beginning of like disasters, of which the public has been repeatedly warned. It has the immediate effect of effectually dispelling the complacent impression that our adversary did not seriously intend to attack our troop ships for some occult reason that would have been characteristic enough in some particulars, but hardly supposable of pitiless, determined German warfare in the presence of an opportunity. The disaster invoked the following statement from the Secretary of War:

The sinking of the *Tuscania* brings us face to face with the losses of war in its most relentless form. It is a fresh challenge to the civilized world by an adversary who has refined, but made more deadly, the stealth of the savage in warfare. We must win this war, and we will win this war. Losses like this unite the country in sympathy with the families of those who have suffered loss; they also unite us to make more determined our purpose to press on. As rapidly as details come in they will be given to the public in order to relieve anxiety where possible, and notice will be sent as promptly as possible to those whose sons and brothers have been added to the nation's heroic dead.—*Army and Navy Register*, 9/2.

This was not in the zone patrolled by the U. S. destroyers.—*N. Y. Times*.

OUR HARDY DESTROYERS.—*One in European Service Steamed 25,000 Miles Without Docking.*—American destroyers are standing the strain of war service in foreign waters better than the most sanguine official here expected. Recent reports from the destroyer force show that few vessels have been out of commission for any length of time for repairs, despite the arduous character of their work. The seamanship of the men aboard the fighting craft and the skill of the picked forces on the repair ships are held responsible for the result, although substantial construction, selected material and good designing play their part.

The most striking instance of the seaworthiness of these light craft is that of a destroyer which went into drydock only after having steamed more than 25,000 miles. Examination showed the boat needed only scraping and painting. Her engines and machinery equipment generally had been kept in perfect order by her own men and the repair ship crews while she was afloat.

The durability of the boats is especially striking in view of the fact that their plating is only a little more than a quarter of an inch in thickness. They were not built for high speed in rough water, yet the call of a merchantman, beset by a submarine, sends them plunging through gigantic seas at a racing gait. There have been cases where the impact of the water twisted the bows somewhat, but these are few, and the damage was easily repaired. Steering engines have worn out, and boilers have been replaced or retubed, in most instances by the repair ships. British officials have expressed high admiration for the handling of the flotilla in this regard.

A complete supply of spare parts for the boats has been assembled at the base, and the officers in charge of the engineering problems are picked men.

As the destroyer construction program moves forward at home, the strain on the boats abroad will lessen. Congress has been warned, however, that the strenuous character of the work in chasing submarines is certain to wear out some of the older boats.—*N. Y. Times*, 21/1.

U. S. FLEET ON GUARD WITH BRITISH.—We are apt to forget that over on the other side the control of the surface of the ocean has been absolutely maintained by the existence of the British battleship fleet. There have been a few raids on the coast of England, and a few engagements in the North Sea, but to-day the relative strength of the British Navy is at least as great against the German Navy as at the outbreak of the war. Furthermore, they have the active cooperation of the French and American surface ships of heavy tonnage. We have, of course, many battleships on this coast that little is heard about. We have had to use the oldest ones largely as training schools, especially for the training of the gun crews of the merchant ships. (From speech of Assistant Secretary of the Navy.)—*N. Y. Times*, 17/2.

The work of the United States is not now confined to destroyers. The Secretary of the Navy, Mr. Daniels, has announced that naval vessels of every type are now doing service abroad.

The most definite information on this subject, however, is given by Representative Miller, of Minnesota, who recently returned to the United States after interviewing many British and French naval commanders.

The American battleship fleet is no longer "bottled up" in sheltered waters in fear of submarine attack. Several of the first-class ships have been sent abroad. These are coal burners, which for a time, at least, will relieve the British battleships of the oil burning type.

What portion of the fleet is now working with the British Navy is, of course, kept a military secret, but the American people at least have the assurance that the United States Navy is doing its full duty in maintaining the allied guardianship of the seas.

The facts about the American fleet are woven into a speech made in the House by Representative Miller in the course of a presentation of war conditions as he observed them while abroad. His statements, made partly because he told of things he saw and partly from things he was told by British and American naval commanders, shed a light upon the whereabouts of the American fleet and its operations that hitherto has been locked in the secret archives of the Navy Department.

Mr. Miller frankly told the House that when he was there Vice-Admiral Sims had 36 destroyers—not the number now—with which to patrol waters assigned to him. These waters extended west of the coast of Ireland, down across the western entrance of the English Channel, clear across the western coast of France and Ireland, the coast of Spain, down to the Azores Islands.

"This number was grossly insufficient," Mr. Miller said, "but the navy has started on a program that will produce any needed destroyers. Some of these destroyers are being delivered."

Before the sinking of the *Tuscania*, which occurred in waters outside the zone being protected by American craft, Mr. Miller said that disaster had been narrowly averted more than once, and that the navy's first duty was to protect the line of communication between France and America.

The speaker said he was in Europe when the request was made for American battleships, and he said that request had been granted.

"They have been sent," he said, "and no better battleships ever floated on a sea. I was afraid our navy would not send them, but I made particular inquiry and followed it up and found they have been sent."

That the American war craft are in the thickest of the submarine danger zone is shown by what was said of the area covered by the German submarines. Much of this area is said also to be covered by American craft.

"The main submarine base," Mr. Miller said, "is at Zeebrugge, on the North Sea. The main area of operation is across the northern part of Scotland and the upper part of Ireland, and then the English Channel. Continuing, their field is the Bay of Biscay, then along the coasts of Spain and Portugal, and then out to the Azores."

"Moments of grave danger are just about sunrise in the morning and sunset at night, especially if the sea is calm. Because during that twilight period there is that uncertainty of light which makes it difficult to discover the periscope of a submarine, but easy for the submarine to see the hulk of the ship in bold relief," said Mr. Miller.

In showing the valuable contribution made to naval strategy by Vice-Admiral Sims, Mr. Miller said his suggestion was this:

"What is the use of sending destroyers and ships of your navy scouring the seas, hunting for submarines? The seas are vast and the submarine is small. They may seek for days and weeks and not find their quarry, but you group your ships together and put your destroyers about your ships and you are bound to have your destroyers meet the submarine. The submarine must find the ships and in finding the ships he meets his deadly enemy."

This suggestion of Vice-Admiral Sims was finally accepted by the British Admiralty.

Mr. Miller declared Congress and the Navy Department should give Admiral Sims absolute carte blanche and carry out whatever he recommended.

Mr. Miller related this incident to emphasize his belief that there should be better co-ordination in the handling of both merchant ships and the protecting war craft.

"Two ships had left a port in France and were some fifty miles up the coast when instructed by wireless to wait for some other boats. They were to leeward of an island, with all communication between them and the shore cut off.

"After they had waited five days the destroyers to escort them through the submarine zone appeared. For some unaccountable reason the ships did not sail even then. The destroyers fooled around, going back and forth for further orders. On the eighth day, under most unfavorable conditions, this group set forth. Why, submarines had been for a week spotting exactly where they were. Is it any wonder they were attacked twice before they got through the zone?"—*N. Y. Herald*, 15/2.

GERMANY EXTENDS SUBMARINE BLOCKADE ZONE; U. S. IS NOTIFIED THROUGH THE SWISS LEGATION.—The Swiss Legation in Washington has transmitted to the Department of State the following communication from the German Government:

"Supplement to the German declaration of January 31, 1917, concerning the blockaded zone.

"On and after January 11, 1918, a new zone of sea is declared blockaded around the enemy point of support in Cape Verde Islands and Dakar and the adjoining coasts. That zone is bounded as follows:

"From the Cape Palmas lighthouse toward the point 10° 0′ N., 29° 30′ W., to the point 17° 0′ N., 29° 30′ W., to the point 20° 30′ N., to the point 25° 30′ W.; there the line follows the parallel 20° 30′ latitude northeastwardly as far as the point where that parallel strikes the western coast of Africa.

"On the same date the zone blockaded around the Azores will be extended eastward as far as Madere Island, which is used by our enemies as a point of support, so that the zone will be bounded as follows: From point 44° 0′ N., 34° 0′ W., to point 42° 30′ N., 37° 0′ W., to the point 37° 0′ N., 37° 0′ W., to point 30° 0′ N., 27° 0′ W., to the point 30° 0′ N., 17° 0′ W., to the point 34° 0′ N., 12° 0′ W., to the point 36° 45′ N., 12° 0′ W., and back to the starting point.

"Neutral vessels which at the time of publication of this declaration happen to be in ports within the new blockade zone may yet leave those ports without coming under the military measures ordered for that zone if they can leave before or on January 18, 1918, and take the shortest route to the free regions. Sufficient time has been allowed so that neutral vessels that may enter the new blockaded zone without having a knowledge of the present declaration or unable to gain such knowledge be spared.

"It is earnestly recommended that neutral shipping be cautioned and warned off the blockade zone."

Berlin, January 5, 1918.—*Official Bulletin*, 31/1.

HUNTING U-BOATS 300 MILES AT SEA.—*Commander Taussig, Who Took Over First Squadron of Our Destroyers, Tells of Hazardous Work.—A Hard Bird to Catch.—Advantage Over Surface Craft is Difficult to Overcome, but Destroyers are the Best Weapon.*—More destroyers as the surest defence against the submarine are recommended by Commander J. K. Taussig, U. S. N., who commanded the first squadron of American destroyers that joined the British patrol vessels in Irish waters after the United States entered the war. Commander Taussig made this statement in an address delivered at the recent war thrift meeting in Carnegie Hall, and gave a picture of the routine of patrol work and the difficulty of actually getting at particular submarines.

That actual destruction of enemy submersibles, a comparatively infrequent feat, is only a part of the work of protecting the merchant marine was evident from Commander Taussig's statements. In seven months, he said, his own destroyer got a chance to fire at a submarine only once. With depth bombs, he said, he thought he had damaged one or two, but could not be sure he had sunk any. And yet in convoy and patrol work his vessel, and those associated with it, did extremely valuable work in the protection of the lanes of traffic.

"When the United States became a belligerent last April," he said, "one of the first requests the Allies made was that we send as many destroyers and other patrol boats as we could possibly muster over to the other side to assist them in combating the submarines. At 9.30 one April night I received orders to proceed at daylight to my home navy yard to fit out for distant service. What was before us I did not know. There were five other commanding officers of destroyers who received the same orders and at 5 o'clock the following morning we left Chesapeake Bay and were on our way to New York and Boston at a high speed, in order that we might get ready as soon as possible for whatever it was to be.

"So anxious was the Navy Department that the outside world in general know nothing of the movement of these ships that not even I, who was in command of the expedition, was informed of our destination. We went to the navy yards, the ships went in dock, had their bottoms cleaned, painted, we took on stores and provisions to last three months, and in a few days sailed from Boston. My orders were to proceed to a point 50 miles east of Cap Cod, and then open my sealed instructions. Until I got to that point at midnight of the first night out, I did not know that our first port of call was to be Queenstown, Ireland.

"It is quite natural that the few in authority who knew of our movements watched with anxiety for news of our crossing. It was the first time that vessels of this type had ever made so long a continuous passage without refueling or without the company of larger vessels. We were 10 days in making the trip, due mostly to a southeast gale, which accompanied us for 7 of the 10 days. So rough was the sea during this time that for 7 of the 10 days we did not set our mess tables; we ate off our laps. On the ninth day we were pleased to be met by a little British destroyer named the *Mary Rose*. She picked us up early one morning and came along flying the international signal, 'Welcome to the American Colors.'

"To this I replied, 'Thank you, we are glad of your company.' The little *Mary Rose* then accompanied us to Queenstown. I am sorry to say that three months later the *Mary Rose* was sunk with all hands by a German raider in the North Sea. We received a very hearty welcome at Queenstown by the British Admiral, Sir Lewis Bailey, and by the others in authority there. They were very glad to see us.

"Things were looking black. In the three previous weeks the submarines had sunk 152 British merchant ships. It was manifest that this thing could not go on if the Allies were to win the war. The British admiral gave us some wholesome advice in regard how best to fight the submarines. We immediately prepared for this service by having what are known as depth charges or depth bombs installed. We put ashore all of our surplus stores and provisions in order to lighten our draft, as it was possible that a few inches might save us from striking a mine.

"The seriousness of the work before us was made very evident, not only by the large vessels that were being sunk, but by the fact that the night before we entered the harbor a German submarine had planted 12 mines right in the channel. Fortunately for us, they were swept up by the ever-vigilant British mine sweepers before we arrived. The day following our arrival one of the British gunboats from our station was torpedoed and her captain and 40 of her crew were lost.

"Patrol vessels were continually bringing in the survivors from the various ships as they were sunk. The British admiral told us that we would go on patrol duty for six days at a time. and then come in for two or three days' rest. In this patrol duty we were assigned to certain areas, as far as 300 miles off shore, as the submarines were then operating that far out. Our orders were first to destroy submarines, second to escort our convoy valuable merchant ships; third, to save lives if we could. We did escort many ships, and we did save many lives.

"I cannot say that we sank many submarines. The submarine, I found, was a very difficult bird to catch. He has tremendous advantage over the surface craft. In the first place, he always sees you first. First, because when on the surface he is very low, and when submerged he has only his periscope out, or perhaps nothing at all. As he was not after destroyers, he avoided us whenever he could. That is, if he saw the destroyer on the horizon, the submarine immediately went the other way.

"When we saw a submarine, which sometimes happened frequently, and at other times several weeks might pass without seeing one, we would immediately go after him full speed, and open fire with our guns in the hopes of getting in a shot before he submerged, but he always submerged very quickly. Only once did my vessel in seven months succeed in actually firing at a submarine. He then went down after the fifth shot was fired. At that time he was 5 miles away. But what they are afraid of are the depth charges or depth bombs.

"I will tell you how they operate. A depth charge is about two or three hundred pounds of a high explosive. It is fitted so as to explode automatically at any depth we may desire. The destroyers and patrol vessels carry them on deck at the stern. When we see a submarine submerge we try to find his wake, and if we can see the wake of a submerged vessel we run over it, drop the depth charge by simply pulling a lever, and in a few seconds there is a terrific explosion.

"This explosion is so great that on one or two occasions, when I happened to be in the chart house when they let go, I thought my own ship was torpedoed. They can be felt under water for a distance of several miles, but of course they must be dropped very close to the submarine in order to destroy him. If we get it say within 90 feet of the hull, it may damage it enough to cause him to sink, otherwise only superficial damage may result.

"I cannot say positively that I sank any submarines. I saw results on several occasions which led me to believe that I had at least damaged one or two.

"The patrol duty was very trying, as the ocean was strewn with wreckage for a distance of 300 miles off shore. It was hard to tell a periscope when we saw one. Fish, floating spars, and many other objects were taken for periscopes and fired at; we could not afford to take a chance, as our whole safety depended on our being vigilant.

"The submarines became less active—I won't say they became less active, but they did less damage as the summer wore on, due, undoubtedly, to having more patrol vessels.

"Then the scheme was taken up of having convoys. The advantage of a convoy is that 6 or 10 destroyers can protect from 20 to 30 merchant ships, while in the patrol system only one destroyer could be with one merchant ship at a time. The convoy system has now developed so that practically all vessels passing through the danger zone are in large convoys of from 10 to 30, with an escort of from 6 to 10 destroyers.

"These convoy trips would take us out of port from six to eight days. They were very trying days, especially during the latter part of the fall, when the weather got bad. When we are at sea in this way we do not take off our clothes, neither officer nor man. We must be ready at all times. We do not even have the pleasure of taking a bath, as something might happen and you would not be ready for it. As one young officer expressed it, we had to come down to the Saturday night bath habit, and if we happened to be at sea Saturday night we might be out of luck.

"The night work was very difficult, as the danger of collision was grea with so many ships without lights operating in close proximity. There ar frequent collisions, and we must use our judgment as to whether we shoul turn on our lights and avoid the danger of collisions, and take the risk a submarine seeing us, or keeping our lights out and taking our chance We have this to remember, that if a submarine sinks us, she only sinks o ship, but a serious collision may result in the sinking of two ships, so it is matter of judgment.

"The question is, can we beat the submarine? I am sure we can if t people will do their part. We now have enough destroyers, or almo enough, to make the convoy system successful. We want more destroye in order that we can have a patrol in addition to the convoy. When convoy we are on the defensive, we do not see the submarine unless comes to us, but when we are on the patrol we are on the offensive, we out and look for them, and we hound them until we destroy them drive them out of the area. So we must have enough for both."—*N. Times*, 3/2.

NORTH SEA AND CHANNEL

COLLISION SINKS GUNBOAT IN CHANNEL.—The British torpedo gunb *Hazard* was sunk in the English Channel on January 28 as the result of collision, the Admiralty announced. Three men were lost.

[The torpedo gunboat *Hazard* was built in 1894 and measured 10 tons. She was 250 feet long and her normal complement was 115 men.] *N. Y. Herald*, 31/1

BERLIN REPORTS NAVAL ATTACKS ON OSTEND.—Ostend, on the Belgia coast, has been bombarded by naval forces, it is announced in army headquarters' report.—*Evening Star*, 21/1.

GERMAN MINES SINK OWN DESTROYERS.—The mine field responsible for the sinking of the German destroyers *A-73* and *A-79* was of German origin. the 17 men from the crew of the *A-79*, the only survivors from the two vessels, suffered greatly four days in the open sea. It was from these survivors it was learned the mine field was German.—*N. Y. Herald*, 26/1.

WIDEN PROHIBITED ZONE IN NORTH SEA.—Notice of the alteration of the probibited zone in the Irish and North Sea channels issued by the British Admiralty was transmitted to the State Department by the American Consul General in London. Navigation is now forbidden to all vessels in the area bounded on the northwest by a line joining latitude 56 degrees, 22½ minutes north, longitude 6 degrees, 17 minutes west, and latitude 55 degrees, 31 minutes north, longitude 6 degrees, 2 minutes west, bounded on the southeast by a line joining latitude 55 degrees, 13½ minutes north, longitude 5 degrees, 30 minutes west, and latitude 55 degrees, 2 minutes north, longitude 5 degrees, 40½ minutes west, bounded on the southwest by a line joining first and fourth points, bounded on the northeast by a line joining second and third points.—*N. Y. Herald*, 5/2.

FIGHTING U-BOATS FROM TOWED KITE BALLOONS.—Among other agencies brought to bear on the German submarines is the kite balloon of the type so extensively employed on the fighting fronts. The French Navy, in particular, is employing a number of kite balloons with tenders for the purpose of spotting U-boats lurking near the coast and at the entrances to important harbors. The life of the kite observer at sea is full of thrills, especially during those times when he climbs up to the balloon swinging above the trawler and when he slides down the ropes to the deck of the trawler. It is said of these kite observers that some of their feats in this connection would compare most favorably with those of a trained tight-rope walker. But once in the basket of the balloon, the work is devoid of that excitement which is part and parcel of the work of the land observer. The U-boat can be readily spotted from a height of a few hundred feet, even when they are below the surface of the water, provided the sea is not too choppy and the light conditions are favorable.—*Scientific American.*

SEA YIELDS UP GERMAN DEAD.—Belief that a naval engagement has occurred is expressed in a dispatch received in Stockholm from Gothenburg and forwarded by the correspondent of the *Morning Post.* The dispatch reports the recovery of a large number of bodies of German sailors, who apparently belonged to a warship.

Gothenburg is on the western coast of Sweden, and is near the Skagerrak, one of the bodies of water connecting the North and the Baltic seas and the one nearest the North Sea. The North Sea in the vicinity of the Skagerrak has been the scene of previous naval engagements, the great battle of Jutland having been fought there.—*Washington Post*, 17/2.

THE THIRD ATTACK ON YARMOUTH.—Yarmouth, January 15.—Yarmouth, which was bombarded in November, 1914, and again at Easter, 1916, was made the target of enemy guns for the third time last night. It is not known whether a destroyer or a submarine made this last attack, which opened at 11 o'clock when a star shell lit up the town. A fusillade of shells followed, and swept the town for about five minutes, after which the raider vanished. Many of the inhabitants were in bed, and others were at supper, while some were making their way home from picture theatres. People who were out state that they heard the whistle of the shells overhead, and saw glares in the sky as the explosions occurred.

Four deaths have been reported. One person was killed and another severely wounded in one house by a bursting shell. A man and his wife are two other victims, and a sailor was killed on board a steamer in the harbor. Other casualties occurred, some persons being severely, and others only slightly, injured.

One shell wrecked the frontages of several houses and shops. The roofs of some houses were carried away, and the fronts of other premises were destroyed. A doctor's house was badly knocked about, while concussion caused by the exploding shells caused other damage to property. On the whole the damage was not great. Houses were filled with brickwork, stoves were blown out, doors wrenched from their hinges, and much window glass was broken. Many persons had remarkable escapes. One room was wrecked, but the child sleeping in a cot escaped without a scratch. Everything happened so quickly that all the damage had been done before people realized what was happening.

The inquest will be held to-morrow.

THE ATTACK ON YARMOUTH.

The Raid: A Comparison.—The accounts of the British raid on Karlsruhe and the German raid on Yarmouth contain instructive points of contrast. The former was persumably in the nature of a reprisal, and it may be recalled that the bombardment of Whitehaven by a submarine in August, 1915, was said to be a reprisal for the shelling of a Turkish troop train by a British submarine in the sea of Marmora. But in every other sense, what a difference! The British airmen attacked in broad daylight, selecting as targets for their bombs railway junctions, munition works, and other establishments, all of military value. They also waited after the job was done in order to obtain photographic confirmation of the destruction wrought. The place they attacked was defended both by anti-aircraft armament and by aeroplanes.

Compare these details with those of the attack on Yarmouth. It occurred on one of the darkest nights of the winter, and the raider hurried off in haste after he had thrown a few shells into the town. No damage was, or could have been, done which is likely to have any influence on the progress of the war. This business was pure devilry. There is no real menace to the security of our shores from such attacks, which from a naval or military point of view are singularly futile. That the raider was a sub-

marine is most probable, for a formation of destroyers or a squadron of light cruisers would have carried out a heavier bombardment. There is, indeed, a close resemblance in this case to those of Seaham, Southwold, and Scarborough. The object of the enemy is to maintain the fiction that our control of the North Sea is in dispute, and to produce a pleasing spectacular effect for German eyes, which acts as a set-off to disasters elsewhere. Funchal, in Madeira, and Bayonne, in the Bay of Biscay, are other places which have been subjected to the same kind of wanton outrage.—*London Times*, 10/1.

MEDITERRANEAN

BRITISH CRAFT SUNK IN MEDITERRANEAN.—The transport and the fleet auxiliary which were sunk early this month in the Mediterranean, as announced in the House of Commons last week, were the *Aragon* and the *Osmanieh*.

The British steamship *Aragon*, 9588 tons gross and 513 feet long, was built in Belfast in 1905 and was operated by the Royal Mail Steam Packet Company of Belfast before being taken over by the British Admiralty. The British steamship *Osmanieh*, 4041 tons gross and 360 feet long, was built in 1906 and owned in London.—*N. Y. Herald*, 31/1.

SUNK A DUMMY CRUISER.—*U-Boat in the Mediterranean Neglected a Convoy to Attack it.*—Apropos of the story printed in the *New York Times*, of the exploits of the British dummy naval vessels, which has been republished here and read with much amusement and interest, Reuter's Agency is informed of one authenticated case of a valuable convoy proceeding to the Dardanelles, followed by a "cruiser."

A German submarine that was in the neighborhood allowed the convoy to pass and reserved its energies for the "cruiser." The Germans must have been greatly surprised when they saw the big guns from the supposed warship floating away from the wreck.—*London Times*.

BRITISH AND TURKISH SEA ACTIONS.—In an action between British and Turkish warships on the morning of January 20, at the entrance to the Dardanelles, the Turks lost one of their most effective warships, with the chances that the fine battle cruiser *Sultan Yawuz Selim*, formerly the *Goeben* of the German Navy, may also prove a total loss. The armored cruiser *Midilli*, formerly the *Breslau* of the German Navy, was the vessel lost. Both of the Turkish warships were manned by Germans, and they only had opposed to them two old monitors and two destroyers and some seaplanes. The British lost the monitor *Raglan* and the small monitor *M-28*, which, so far as vessels go, are minor losses. The *Sultan Yawuz Selim* was so badly damaged by a mine that she had to be run ashore at Nagara Point, in the narrows of the straits. She has been further bombed by British aircraft and may yet prove a total loss. The *Midilli* was sunk by striking a mine after being driven by British destroyers during the fight into a British mine field. Turkish destroyers attempting to go to her rescue were driven off by British destroyers, and the British rescued 172 Germans of the *Midilli*. Her complement was 373. Of the total men on the two British ships 132 were saved; 220 men perished. The *Sultan Selim* and the *Midilli*, the British Admiralty explains, had emerged from the Dardanelles to attack British naval forces north of the island of Imbros. After the *Raglan* and *M-28* were sunk the *Midilli* went to the bottom, and the *Sultan Selim* to escape then headed toward the Dardanelles at full speed and struck the mine. The British Admiralty reported on January 23 that the bombing attacks on the *Sultan Selim* were being continued, and that two hits with heavy bombs had been made.

The Turkish official report of the action says: "In a clever attack the cruisers *Sultan Selim* and *Midilli*, with some topedo-boats, issued from the Dardanelles January 20 in order to destroy enemy forces which had been located near the island of Imbros. Two enemy monitors, the *Raglan*, 4500 tons, with two 14-inch guns and the *M-28*, 500 tons, with one 9-inch gun,

and another smaller gun; a transport ship of 2000 tons, a signal station and numerous munition depots were destroyed. There was lively aerial activity on both sides. An enemy airplane was shot down in an aerial fight, and a second was seriously damaged. Our coast batteries successfully bombarded enemy torpedo-boats. On the return trip the *Midilli* was sunk by striking several mines."

The *Sultan Selim* was a sister ship to the *Moltke*, and was completed in 1912. She was a 28-knot ship, had a length of 610¼ feet and a displacement of 22,640 tons. She used both coal and oil in her furnaces. Her main battery was ten 11-inch guns and she was provided with two torpedo tubes. She had side armor of 11 inches and armored decks of 3 inches. Her complement was 1025 officers and men. She and the *Midilli* were nominally purchased from Germany in August, 1914, but the sale is held to have been entirely spurious. Both vessels successfully eluded the Allied warships on the watch for them in the Mediterranean and reached a Turkish port safely.

The *Midilli* was completed at Stettin in April, 1912, and her best speed on an hour's run was 27.55 knots. Her length over all was 446 feet and her normal displacement was 4550 tons. She had an armor belt amidships of 3½ inches, an armored deck of 2 inches and carried twelve 4.1-inch guns and had two torpedo tubes. She burned both coal and oil.

Both ships have been very active in the Black Sea and have been reported in Russian dispatches as sunk or seriously injured on several occasions. A British official report told of dropping bombs on the *Sultan Selim* in July, 1917, with the result, it was said, that her injuries would keep her in port several months. Her inactivity since that time would indicate the correctness of this last report.

The Turkish Navy has suffered heavily during the war. The known losses are: Two battleships, two protected cruisers, ten gunboats, two torpedo-boat destroyers, three torpedo-boats and twenty-three supply ships and transports.—*Army and Navy Journal*, 26/1.

AIRMEN CONTINUE "GOEBEN" ATTACKS.—London, Wednesday.—Several attacks by day and night have been made by British naval airplanes on the cruiser *Goeben*, stranded in the Dardanelles, and two hits with heavy bombs were made, it was officially announced to-day. The announcement reads:

"Naval air service machines have made several day and night attacks on the *Goeben* and secured two hits with heavy bombs. They have also bombed one of the tugs which is secured alongside the *Goeben*. In every case heavy anti-aircraft gunfire was encountered, but all our machines returned safely.

"The attacks are continuing."—*N. Y. Herald*, 24/1.

The *Goeben* was floated and reached port.

PACIFIC

THE JAPANESE AT VLADIVOSTOCK.—No official announcement has been made with regard to this new development in the Far East. The only people who criticize it adversely are those who think that Germany will be sooner moved to practical repentance by the Allies assuming that she is a civilized nation than by teaching her that she is not one in the way she understands—that is to say, by force. That Japan's occupation of Vladivostock may not square with the letter of Allied professions may be true enough; but it certainly squares with their spirit, which, after all, is the chief thing. As for the contention that Russia is our ally, and that Japan by this action is violating the obligations of partnership, it is as if when a man's house is on fire his friends should refrain from saving as many of his goods as they could in case he might misconstrue their help. At present Russia is voiceless, except on a note that no one cares to hear except the enemy. Japan wisely cuts the far-fetched considerations of the "Allied featists," and keeps guard in Vladivostock. She has several good reaso

all of which are understood by the Allies. One is that the port is the Pacific terminus of the trans-Siberian railway, and as such is a great depot for vast quantities of munitions and other war material supplied by Britain, France and the United States for the use of Russia's armies. As the Bolshevik caricature of a government knows why they are not performing their share in the war, it cannot be permitted to inflict further loss upon the Allies by disposing of the war material at Vladivostock. Again, there is a large internment camp in the vicinity, the prisoners in which must not be permitted to escape. That Vladivostock may be turned into a base for enemy raiders and submarines in the Western Pacific is, too, a contingency, however remote, which must be provided against, and Japan is doing it in the only way possible. How could the situation be met in any other way?—*Army and Navy Gazette*, 22/12.

MORE ENTENTE WARSHIPS ARRIVE AT VLADIVOSTOK.—Five more Entente warships have arrived at Vladivostok, according to special dispatches from Petrograd. It is added that China, acting on allied advice, has forbidden exportation of foodstuffs to Russia.

The British embassy in Petrograd January 26 informed the Bolshevik Government that British warships were at Vladivostok to protect Allied subjects against possible disorder.—*Evening Star*, 1/2.

JAPANESE TROOPS LAND AT VLADIVOSTOK.—The *Naschivek*, formerly the *Retop*, asserts that a Japanese cruiser at Vladivostok has put troops ashore and that the Japanese consul there has issued a proclamation declaring that the Japanese soldiers are to keep order, owing to the danger threatening Japanese citizens. The proclamation of the consul adds that the soldiers have no other motives and no desire to interfere in Russian affairs.—*Evening Star*, 19/1.

CHINESE FIRE UPON GUNBOAT "MONOCACY."—The American gunboat *Monocacy* was fired upon by the Chinese 50 miles above Yochow, on the Yang-tse-Kiang. A sailor named O'Brien was killed and two other sailors were wounded.

The attack was made near Kien-Lih-Sien and came without warning. The attackers hid behind a dike on the north bank of the Yang-tse-Kiang. The gunboat returned the fire but with what result is not known. Afterward the *Monocacy* proceeded to Hankow.

The firing lasted for half an hour. It is presumed that the assailants were a detachment of the southern revolutionary forces.

The reason for the attack and details of it have not yet been received. Dr. Paul S. Reinsch, the American ambassador, will demand of the foreign office that responsibility for the attack be fixed and the offenders punished, and also that measures shall be taken to safeguard shipping. Dr. Reinsch does not believe that the attack indicates an anti-foreign feeling, but rather that it was intended to bring up complications for the central government.

The Japanese steamer *Tayuen* also was subjected to fusillades.

The commander of the American gunboat fired upon by Chinese rebels reported that he returned the fire and silenced it.

American Minister Reinsch's dispatches to the State Department to-day bearing on the attack on the *Monocacy*, contained no additional details to those already received in press dispatches. Minister Reinsch said he had already made representations to the Chinese Government.

Secretary Daniels gave out the following:

"On January 17, at 9 a. m., the United States gunboat *Monocacy*, while cruising about 50 miles above Yochow, on the Yang-tse-Kiang River, was fired on by intrenched Chinese, and was hit a number of times. H. L. O'Brien, chief yeoman, was fatally injured, and W. N. Donelly, seaman, slightly wounded. The fire was returned by the *Monocacy* and silenced.

"It is believed that the Chinese were bandits or revolutionists."—*Evening Star*, 22/1.

GENERAL NOTES

U-BOATS HAVE SUNK OVER 6,000,000 TONS.—*End of Year of German Frightfulness at Sea Shows Britain the Heaviest Loser.—Norway Leads Neutrals.—America's Loss Put at 69 Ships in the 12 Months of German Attack.*—A year ago the German Government decreed unrestricted submarine warfare against enemy and neutral merchant vessels. The decree read:

"From Feb. 1, 1917, sea traffic will be stopped with every available weapon and without further notice."

The danger zone around the British Isles, established in February, 1915, was enlarged and made to include the western Mediterranean. A prohibited zone was also established for hospital ships on the ground of the alleged misuse of these ships by the Allies.

The decree repudiated Germany's note to the United States of May 4, 1916, in which she promised henceforth to conduct her submarine campaign in accordance with the laws of nations—search and capture, and sinking only when the presence of contraband aboard had been proved and there was no opportunity to take the vessel to a home port and the safety of the personnel had been assured.

According to figures in the following tables, which are official unless otherwise designated, the total of tonnage lost of Allies and neutrals from January 1, 1917 to January 26, 1918, was 6,617,000 while in the same period (all official accounts either begin with the last week of February or combine January and February), the total number of British ships, exclusive of fishing craft, was 1169.

TONNAGE LOST BY ALLIES AND NEUTRALS

Month	
January 1 to February 25, 1917	812,000
March	600,000
April	788,000
May	549,000
June	758,000
July	463,000
August	591,000
September	*455,000
October	*470,000
November	*435,000
December	*388,000
To January 26, 1918	*308,000
Total	6,617,000

BRITISH LOSSES IN SHIPS

	Number ships
January 1 to February 25, 1917	140
Four weeks March	93
Five weeks April	185
Four weeks May	113
Five weeks June	110
Four weeks July	81
Five weeks August	104
Four weeks September	73
Five weeks October	87
Four weeks November	61
Four weeks December	70
To January 26, 1918	52
Total	1,169

* Estimated.

Aside from the belligerent, Great Britain, with a loss of 1169 ships, exclusive of fishing craft, Norway, a neutral, has been the heaviest loser.

On January 4, a Copenhagen dispatch announced that in 1917 Norwegian vessels with an aggregate tonnage of 566,000 were sunk. According to figures kept in the *Times* office 69 merchant vessels flying the American flag were also sunk in the same period.

The exact number of submarines which came to grief in their unrestricted campaign is not known, but, according to the State Department, the average sinkings of them for the first 11 months were 1.25 a day, or about 38 a month, while the German rate of construction had been .75 a day, or about 23 a month.

The visible falling off in the work of the submarine during the last three months is accounted for in three ways, each backed up by authoritative and sometimes official conjecture: That the protection offered convoys was growing more adequate; that the engines against the submarine were becoming more effective, particularly the "depth charge"; that many of the super-U-boats had been withdrawn either for refitting or on account of the debilitation of both officers and men.

It has been reported that mutinies at German naval bases have been caused by the enforced draft of men for submarine work. There is also the report that Germany is harboring her submarine strength for a monstrous campaign against American shipping, bearing troops and supplies abroad. Secretary Baker on January 27 predicted such a campaign in the words: "The most powerful submarine offensive hitherto undertaken may be expected."

With the reason given for the recent falling off in sinkings by U-boats, the requisitioning by the government of 426 ships, totaling more than week in June the total of British entrances and clearances reached the maximum for the year—28,204 ships. This figure has dropped steadily until the week of January 26, when the total was 4661. In the first week designated 130 British ships were sunk; in the second, only 21.

A dispatch from France on January 29 stated that 16 former German vessels, including the *Leviathan (Vaterland)* had just landed supplies and men in that country. By taking over German ships the United States has added 515,435 tons to her flag. A further offset to the Allies' loss of tonnage is the requisitioning by the government of 426 ships, totaling more than 2,000,000 gross tons, while contracts have been awarded for 884 ships.

Great Britain had in commission in August, 1914, 16,841,919 tons. She has added to this by construction: In 1915, 1,386,914; in 1916, 2,050,000; in 1917, 2,850,000, and by purchase during the whole foregoing period 80,000 tons, giving a net total of 23,208,433 tons. Of this it has been estimated that she has lost from all causes since the war began 9,116,914 tons, which should leave her in possession to-day of 14,091,514 tons which is only 2,750,000 tons less than what she had when the war began.

Sir Eric Geddes, the First Lord of the British Admiralty, announced in July that Great Britain had 15,000,000 tons afloat, and that the empire's building for the year would be over 2,800,000. Of the 6,000,000 tons contracted for by the United States, it was reported in Washington on January 13 that 327,150 tons requisitioned while under construction would be put into service before the end of March.—*N. Y. Times*, 2/1.

69 OF OUR SHIPS SUNK; 300 DROWNED.—*Official Record of a Year's Experience with German "Frightfulness."—Net Gain of 515,435 Tons by Seizure of German Craft—426 More Ships Requisitioned and 884 Are Being Built.*—In the 12 months of unrestricted warfare launched against American and allied shipping by Germany one year ago there have been sunk by submarines, mines and raiders 69 American vessels, totaling 171,061 gross tons, according to a careful compilation of records of sinkings which have been made public in the period.

Offsetting this loss of American vessels, most of which were sailing ships, the United States since February 1 has added to her merchant

marine by the seizure of former German and Austrian owned ships a total of 107 vessels having a gross tonnage of 686,494, leaving on the credit side of the American ledger in the account with the Central Powers a net gain of 515,435 gross tons. The loss of life caused by the sinking of the 69 American ships was more than 300 persons, however.

The percentage of sinkings of American ships compared with the number of vessels which have sailed through the war zone successfully is small. Records of the Department of Commerce show that for the period beginning February 1, 1917, and ended December 1, there were cleared from American ports in the foreign trade ships aggregating 17,738,900 tons net, or approximately 24,834,400 gross tons. The number of ships making up the total of tons was not made public by the department.

Further offsetting the loss of tonnage occasioned by the submarine warfare, the United States through the Shipping Board requisitioned in American shipyards 426 vessels totaling more than 2,000,000 gross tons, and contracts have been awarded for 884 ships, a large number of which are now under way and are being rushed to completion. In addition, the Shipping Board on October 15 last placed under government requisition 393 American vessels of more than 2500 tons deadweight capacity, which were afloat and immediately assigned them to the task of carrying supplies for the Allies and the American forces abroad.

Including in these requisitioned vessels were 21 ships in Great Lakes trade and in addition there were commandeered 24 steamers building on the lakes for a foreign account and ready for launching. Virtually all of these were brought to Atlantic coast ports and immediately put into service. Almost one-half of them had to be cut in two to get them through the Welland Canal, but the task was accomplished and the ships rejoined in less than three months from the time the contract was awarded.

Another difficulty which faced the United States in the task of putting to sea vessels to offset the ravages of the U-boats was the repairing of the "willful damage" done to the former German ships by their officers and crews before the ships were seized. This cost millions of dollars, and in many instances called for the highest engineering skill to make and replace parts of foreign-built engines and boilers removed or broken.

Indicating that the task has been attended by success, the statement was made to-day by a prominent official connected with the Shipping Board that every seized vessel was now completely repaired and in service. Many of them have made three and four round trips through the war zone.

Three of the former German vessels have been the objects of successful attack by the submarines. The *Actaeon*, formerly the *Adamsturm*, and the *Owasco*, formerly the *Allemannia*, were sunk and the *Armenia* was hit by a torpedo but was saved after being beached. Several other former German ships have been attacked, but escaped.

The announced sinkings of British ships for the year up to and including the week ended January 23 have been 1033 vessels, of which 763 were of more than 1000 tons, and 270 were under that figure. The joint losses of France and Italy have averaged three to four large vessels weekly.—*Washington Evening Star*, 2/1.

ASSERT SUBMARINES SANK 9,000,000 TONS.—The German newspapers assert that in the first year of the unrestricted submarine warfare 9,000,000 tons of Allied and neutral shipping were sunk, and that only 4,000,000 tons have been built to offset this.

As showing how unreliable is the information which the German authorities give out, the Associated Press is authorized to state that the figures put forward exaggerated the actual tonnage lost by more than 50 per cent.

The total net loss of the world's ocean-going tonnage since the beginning of the war, including the losses by marine risk as well as by enemy action, and allowing for enemy tonnage captured, amounts to less than 3,000,000, or 9 per cent of the tonnage available at the beginning of the war.

The semi-official *Norddeutsche Allgemeine Zeitung* and other Berlin newspapers publish articles on the anniversary of unrestricted submarine warfare. They glorify the U-boat as a "weapon which has achieved strategic and moral results, particularly against Great Britain in its world position."—*N. Y. Times*, 3/2.

THE SUBMARINE WAR.—*Secretary Daniels Expects a Continuing Fight, With Losses to Both Sides.*—Washington, January 28.—Prospects of concentrated effort on the part of German submarines to break down the transatlantic line of communication to the American expeditionary forces predicted to-day in the weekly review of the War Department has been foreseen also, but navy officials, it was learned to-night, believe the imminent offensive to be only the usual activities which has always succeeded a lull in submarine warfare.

Secretary Daniels, in reply to questions, said to-day that the navy expects a "continuing fight" with the submarines, with losses to both sides expected. He expressed the belief, however, that new weapons now in use will make such operations increasingly costly to the German Admiralty.—*Baltimore American*, 29/1.

THIRD OF U-BOATS LOST IN 10 MONTHS.—*Germans Fear Depth Bombs, Says Engineer from Kiel.*—Geneva, Switzerland, February 16.—A Swiss engineer employed for the last 10 months at the electrical works at Kiel and who has recently returned, informs the Associated Press that the Germans are making every effort to conceal their submarine losses, especially from the navy, because of increased difficulty in mustering crews. He estimates the Germans lost 30 per cent of their submarines during the time that he was at Kiel.

"I saw a score of submarines lined up in the canal undergoing repairs," he said. "They had been hit by depth bombs, which the Germans seem to fear greatly."

The engineer added that there had been two serious mutinies at Kiel during 1917.—*Washington Post*, 17/2.

U-BOATS SUNK AS FAST AS GERMANY CAN BUILD THEM.—*Back from the Front, Representative Miller Makes Encouraging Report to House.*—Washington, D. C., Tuesday.—Representative Miller, who recently went to the front in France, told the House to-day that he believed German submarines are being destroyed nearly as rapidly as Germany can build them.

He praised Vice Admiral Sims for the methods he had adopted with American destroyers and cruiser convoys to combat the submarine menace, and argued that American shipping should be handled by naval officers and not by the Shipping Board. There were no Americans in the crews of the two transports aboard which he crossed the Atlantic, he said.

Mr. Miller said that during the last 10 months three times as many submarines have been destroyed as were destroyed during the previous two and a half years.—*N. Y. Herald*, 6/2.

ONLY 30 U-BOATS NOW IN WAR ZONE.—A correspondent of the Associated Press, recently returned from Europe, is authority for the statement that the number of German submarines operating in the prohibited zone had until recently been surprisingly small.

During the early period of the winter the number of submarine raiders at work in the zone varied from 12 to a maximum of 18. It was then expected, however, that the Germans would endeavor to increase this number, largely as a threat to the American troop transports, and that they might by this time be able to increase this maximum perhaps to 30 boats. These estimates did not include the smaller "egg planters" or mine-laying submarines.

The most formidable German submarines of which there is any definite record were armed with the new German 15-centimeter (5.9 inches) gun brought out in the war, which is a more powerful, longer-ranged gun than the 15-centimeter gun mounted in the main batteries of the German light cruisers at the outbreak of the war. The newest submarines carried two of these guns, forward and aft.

Much has been heard in the press, neutral and belligerent, of giant 5000-ton "submersible cruisers," but none of these had been identified definitely, according to the latest information in possession of the correspondent, nor had there been any trustworthy news from Germany that the Admiralty was laying down any boats of a tonnage representing such a jump from the size of the most modern submarine operating in the late summer and autumn.

The numerical production of submarines in Germany at that time had fallen off decidedly, due in part perhaps to difficulties with raw material, but chiefly to a decision to suspend the manufacture of small submarines of the "canal" type.

These boats, small enough to proceed to the sea through the canals of Belgium, had been built in comparatively large numbers in series production all over Germany and shipped to salt water, but were found to be too small for effective use under present conditions in the war zone, where destroyers and armed patrol boats compel the representatives of ruthlessness to operate chiefly submerged and to carry armament heavy enough to outrange the light guns on the armed merchantmen.

German experts believed, in fact, that a serious mistake had been made in designing and constructing these craft.—*Nautical Gazette*, 14/2.

DISCONTENT IN GERMAN FLEET.—London, January 25.—A German naval engineer with the rank of lieutenant, who has deserted from Kiel, according to an Amsterdam dispatch to the *Daily Express*, states that dissatisfaction among the men of the German fleet is much more serious than in the army. He asserts there have been important revolts, generally among the crews of mine sweepers.

Three weeks ago a squadron of mine sweeping trawlers entered Hamburg after an expedition in which three men were lost in an encounter with the British, and one of the trawlers was damaged. Before the men were permitted to go ashore, according to this account, they were notified that they must report back for duty within an hour. They asked time for rest. The Hamburg commandant refused, whereupon 150 men declined to obey the order.

An hour later a a lieutenant named Wagner arrived and ordered the men to return to their boats. They refused. The lieutenant swore at the men and struck two of them, the dispatch continues. He was thrown into the water and left to drown.

The commandant who had watched the mutiny dispatched a motorboat carrying two machine guns which were fired into the crowd of sailors, killing 44 and wounding 73. The others were arrested and sentenced to terms of imprisonment varying from 5 to 20 years.—*Washington Evening Star*, 28/1.

THE GERMAN REVOLT.—It is undoubtedly premature to look for the collapse of the German military program because of the internal troubles now prevalent in the empire. Strikers may have quit work by the hundreds of thousands, tying up important industries and spreading disaffection among the people. But the German Government is not impotent to cope with such a strain. It still has the army at command to put down revolt and it will probably do so.

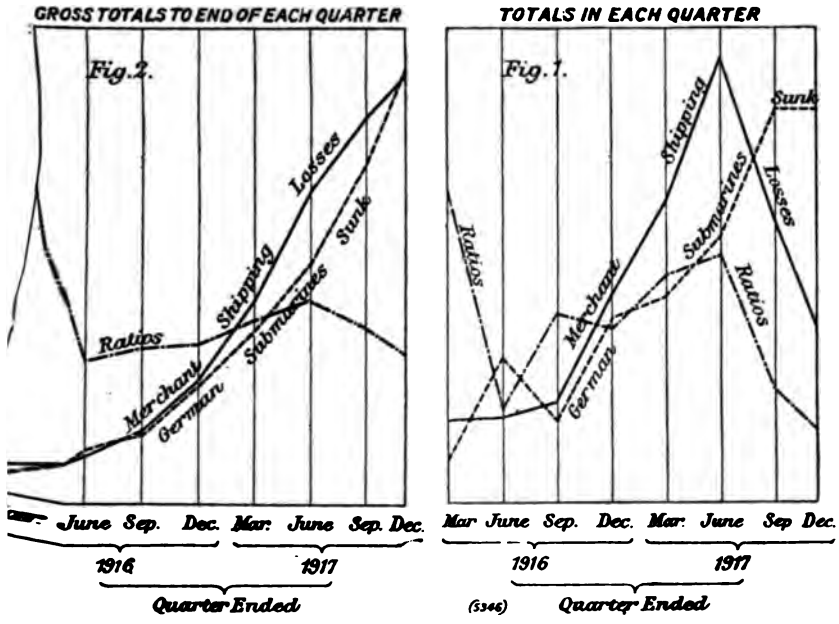
Indeed, it would not be desirable, from the point of view of the Allied nations, for the present strikes to bring the German Government to the point of peacemaking. There is in this outbreak of discontent not yet

a symptom of revolution against the dynastic rule, no protest against the mode of autocratic government. Not until the German people are at the point of refusal to follow longer the lead of irresponsible rulers will the spirit of conquest that is the root of the evil of to-day be broken.

Repression by force of arms may come in Germany in the immediate crisis. In one respect it is to be hoped for by the enemies of Germany. For repression will not allay the sentiment for peace and bring alleviation of intolerable conditions. It will merely postpone the day of final reckoning and intensify the bitterness felt by the people. When the revolt that the government at Berlin must eventually meet comes it will be the more determined for any severities that may now be practiced.

There is great encouragement for the Allies in the fact that this first protest on a large scale against the German military program has gone so far and involved such a large number of workers. It indicates that the leaven of free thought is working in the lump. Doubtless this is a direct result of the negotiations with Russia and the opening of the gates to the infusion of Bolshevik ideas into Germany. Russia may still be Germany's Nemesis.—*Evening Star, 1/2.*

SUBMARINE WAR.—*To the Editor of Engineering. Sir.*—The interesting charts supplied by the naval authorities, published on page 670 of your issue



of December 21, showing the losses by enemy action of merchant tonnage (British, allied and neutral) and the German submarines sunk during each quarter, are shown together in Fig. 1. The former is the full line and the latter the dotted line.

Although the scales of the ordinates in both cases are not marked yet, assuming that they are to scale, the ratios of the ordinates of German submarines sunk to those for merchant shipping losses are obtainable.

These are shown in the dot-dash line and indicate that the best relative results have been obtained in the last quarter.

By adding the ordinates for each quarter the gross totals to the end of each quarter have been obtained. These are shown in Fig. 2, and indicate that the merchant tonnage losses have been increasing in a *decreasing* ratio since the June, 1917, quarter, while the German submarines sunk have been increasing in an *increasing* ratio since September, 1916.

The ratio curve indicates that the general trend from June, 1916, to June, 1917, was against us, but has now been reduced to about that of September, 1916.

Yours faithfully,

HENRY G. LLOYD, M. Inst. C. E.

44 Guilford avenue, Surbiton, December 24, 1917. —*Engineering*, 4/1.

LOOKOUTS IN THE SUBMARINE ZONE.—A recent Admiralty order requires that all British merchant vessels of 2500 tons gross and upwards shall include in their crew four men, specially engaged, who are to act as lookouts at the mastheads. In the submarine zone, these men are to be employed solely on their special duty, keeping watch in four watches, each to be of not more than two hours' duration. They must obtain a Board of Trade certificate as to their eyesight; and they will receive extra pay whilst in the submarine zone.—*Scientific American*, 9/2.

AUSTRIA AND THE ALLIES EXCHANGE PRISONERS.—The first exchange of prisoners of war between Austria and the Allies has taken place near the Austrian frontier at Buchs. Three hundred and twenty-four of these exchanged prisoners have arrived at Geneva. They include two American volunteers, one English officer and 70 British colonials, all of whom were captured on the Turkish and Bulgarian fronts. The others were largely English and Scotch. Seventeen of the exchanged men were carried from the train on stretchers.—*Evening Star*, 14/2.

ENDS GERMAN PAY ROLL.—*U. S. Acts When Boches Fail to Reply on Officer's Salary.*—Germany has failed to reply to the proposal of the United States that German commissioned officers, held prisoners here, receive the pay of their grade in return for similar privileges being accorded American officers held in Germany. So the War Department has cut off the payments which were being made to German officers.—*Evening Star*, 29/1.

THE WAR SITUATION.—The Secretary of War has authorized the publication of the following review of the military operations for the week ending February 9:

At dusk on the evening of February 5 off the Irish coast a torpedo launched from an enemy submarine struck the convoyed liner *Tuscania*, having on board American troops. Our loss at the latest report appears to be approximately 113 men.

The fine discipline of the men and the efficient handling of a difficult situation by those in command contributed to account for these relatively slight casualties.

At the same time, we must express our profound appreciation for the splendid work of the British Navy in rescuing our forces.

Notwithstanding the fact that hostile submarines were lurking in the vicinity, the British destroyers rendered every assistance and remained on the scene, succoring our men until all survivors were brought safely ashore.

At the small ports of Ireland and Scotland where our troops were landed they met with a most warmhearted reception on the part of the people, who did all in their power to administer every comfort and care.

The sector in Lorraine where our forces are in contact with the enemy continued relatively active throughout the week. Artillery duels took place intermittently, but fog and heavy rains prevented infantry engagements. The Germans attempted no further raids and settled down to systematic sniping and bombing of our positions.

Our sharpshooters gave a good account of themselves, keeping the enemy parapets well cleared of Germans.

One stretch of our line is very close up to the German position. Here bombing and a frequent exchange of hand grenades occurred.

German aeroplanes made repeated attempts to push their reconnoitering sallies over our lines, but were invariably met with a hot fire from our anti-aircraft guns.

Our forces engaged have shown themselves well fitted for their tasks in the trenches and are rapidly becoming accustomed to the routine of trench warfare. The welfare of our troops, whether in the trenches or in rest depots, is the object of the immediate personal concern of all our commanders. The rations for the men in the trenches, in spite of the enemy's attempts to break up our transport columns, have been regularly assured. The care of the wounded at our field dressing stations, as well as at our base hospitals, is being carried on with efficiency and scientific skill.

Here in America at our cantonments the training of our new armies is proceeding methodically.

The arrival in the western theater of additional German forces coming originally from the Russian front are noted. Further Austrian divisions have also been detached from other zones of operations and are being concentrated in reserve behind the German lines in the west.

Much dissatisfaction is expressed throughout Austria-Hungary at the policy of dispatching their troops to fight Germany's battles along the western front.

The desire for peace is increasing daily in the Dual Monarchy, and it is only natural that the Austrians should resent sacrificing their forces on distant battlefields in the furtherance of German ambitions alien to their interests.

Flanders was again the scene of numerous minor engagements, particularly the region of the Ypres-Staden Railway, where such fierce fighting took place last autumn. Here the British drove a sharp raid into the enemy territory, inflicting casualties and taking prisoners. The British also raided the German lines successfully southwest of Armentieres as well as east of Hargicourt and elsewhere.

The Germans pushed forward repeated reconnoitering thrusts against British positions northeast of Poelcapelle, in the Cambrai salient, and at a number of other points.

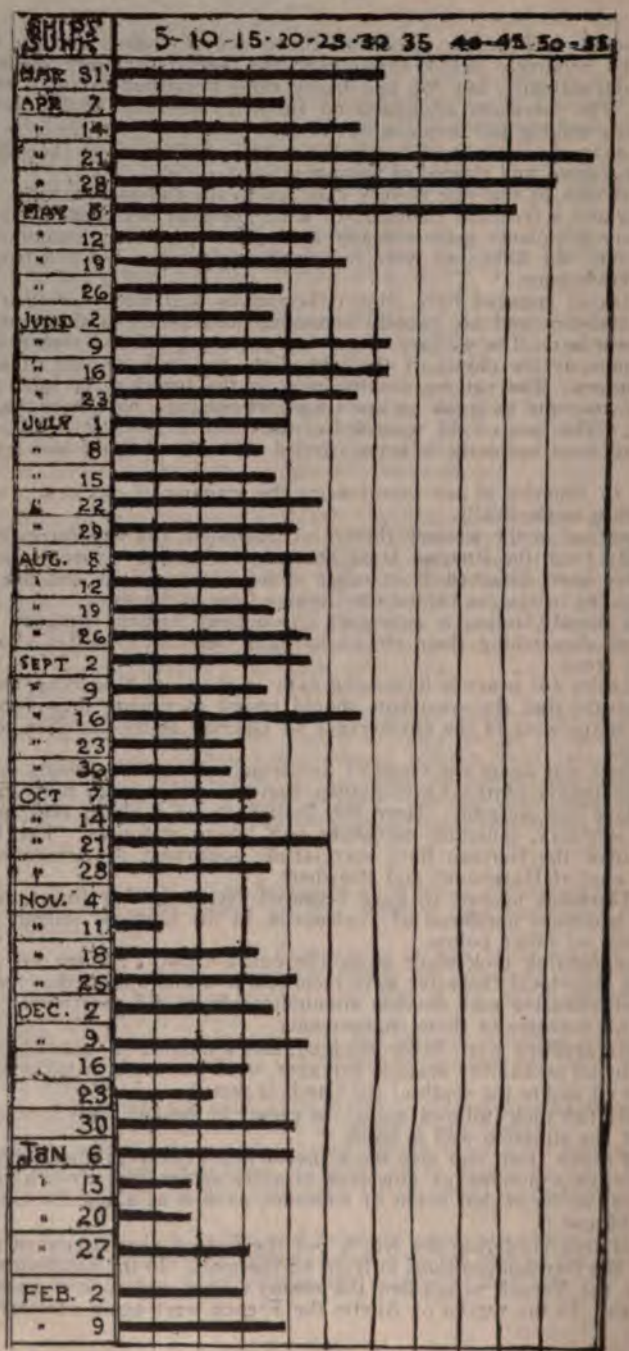
Heavy fighting took place along the entire front. Though no actions of more than local character were recorded, it would appear that the long-deferred offensive may develop simultaneously at different points of the line as an outcome of these engagements.

Hostile artillery were busily engaged, and a number of heavy bombardments, in all probability practice barrages, were put down at various points in front of and to the south of the Cambrai sector.

The British took full measure of the enemy in these various undertakings and had the situation well in hand.

The French front was also the scene of much lively fighting. The Germans drove a number of powerful assaults against the French lines in Lorraine, in the region north of Craonne, as well as along the east bank of the Meuse.

In the area bordering the North Sea the French also attempted a blow against the German positions in front of Nieuport. In the neighborhood of Rheims the French penetrated the enemy's lines and took a number of prisoners. In the region of Ailette the French were again successful and



—*Washington Evening Star*, 31/1.

captured the entire detachment of a German outpost. North of the Chemin des Dames and near Flirey the enemy drove forward raiding parties, but achieved no results.

Artillery bombardments took place over an extended front and, while less violent than in the British areas, nevertheless were of greater magnitude than during the preceding week. Hostile fire was particularly intense along the east bank of the Meuse and in upper Alsace.

The French and British carried out a series of very effective air raids; the French dropping many tons of high explosives on munition plants in Alsace, while the British concentrated their energies on bombing the submarine nests at Ostend and Zeebrugge and hostile aerodomes in the zone of operations.

In the Italian theater no important operations took place. The Austrians were busy rearranging their dispositions of units along the front, and the Italians kept up a continuous harassing bombardment of the entire enemy line. Italian patrols were alert in the region of the headwaters of the Brenta. Northeast of the Monte Grappa minor encounters took place.

The enemy unsuccessfully attempted to explode mines in the Monte Pasubio sector. In the Val Lagarina, and especially along the Lower Piave, artillery duels were very lively.

Austrians are continuing their policy of bombing the open towns of the Venetian Plain. The priceless art treasures of Padua, Bassano, Treviso, etc., religiously respected through all other campaigns in Italy, were during the week the targets of Austrian aviators.

The British in Palestine have advanced their lines slightly north of Jerusalem.—*Army and Navy Register*, 16/2.

INDEX OF WAR VESSEL LOSSES MENTIONED IN THIS NUMBER

NOTE.—A complete table of losses since the beginning of the war will be published semi-annually; the latest appears in the January number of the PROCEEDINGS.

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DIPLOMATIC NOTES

FROM JANUARY 18 TO FEBRUARY 18

PREPARED BY

ALLEN WESTCOTT, PH. D., Instructor, U. S. Naval Academy

LONG RANGE NEGOTIATIONS BETWEEN BELLIGERENTS

During the month ending February 18, the spokesmen of the warring powers continued the process—a noteworthy innovation and advance—of negotiations by public manifestoes without cessation of hostilities. In reply to the specific program of 14 points set forth by President Wilson on January 8, the German Chancellor and the Austro-Hungarian Foreign Minister addressed delegates of their respective Parliaments two weeks later (January 24). In subsequent comment on these replies (February 11), President Wilson stated that he found that of Count Czernin "friendly in tone," that of Count von Hertling "very vague and very confusing." In effect, the German Chancellor insisted that every territorial problem should be settled, not in general council, but in separate negotiations with the nations particularly concerned. Thus, as in the case of Russia, the Central Powers would secure the advantage of dealing severally with the weaker members of the Entente.

COUNT VON HERTLING'S STATEMENT.—In his speech before the Main Committee of the Reichstag on January 24, Count von Hertling maintained a truculent attitude. He declared that the allies spoke as "victors to vanquished" and "still cast covetous eyes on parts of our territories," that "Germany's military position was never so favorable as it now is," and that "if the leaders of the enemy powers really are inclined to peace, let them revise their program once again."

After an extended German version of international relations preceding the war and German claims in Alsace-Lorraine, the Chancellor discussed President Wilson's program, point by point, as follows:

[Note: President Wilson's address of January 8 appears in full in the February PROCEEDINGS.]

"The first point is the demand that there shall be no more secret international agreements. History shows that it is we above all others who would be able to agree to the publicity of diplomatic documents. I recall that our defensive alliance with Austria-Hungary was known to the whole world from 1888, while the offensive agreement of the enemy states first saw the light of publicity during the war, through the revelations of the secret Russian archives. The negotiations at Brest-Litovsk are being conducted with full publicity. This proves that we are quite ready to accept this proposal and declare publicity of negotiations to be a general political principle.

"In his second point Mr. Wilson demands freedom of shipping on the seas in war and peace. This also is demanded by Germany as the first and one of the most important requirements for the future. Therefore, there is here no difference of opinion. The limitation introduced by Mr. Wilson at the end, which I need not quote textually, is not intelligible, appears superfluous and would therefore best be left out."

[The limiting clause reads "except as the seas may be closed in whole or in part by international action for the enforcement of international covenants."]

"It would, however, be highly important for the freedom of shipping in future if strongly fortified naval bases on important international routes, such as England has at Gibraltar, Malta, Aden, Hong Kong, the Falkland Islands, and many other places, were removed.

"Point 3: We, too, are in thorough accord with the removal of economic barriers which interfere with trade in a superfluous manner. We, too, condemn economic war, which would inevitably bear within it causes of future warlike complications.

"Point 4: Limitation of armaments: As already declared by us, the idea of limitation of armaments is entirely discussable. The financial position of all European States after the war might most effectively promote satisfactory solution. [Cries of 'Hear! Hear!'] It is therefore clear that an understanding might be reached without difficulty on the first four points of Mr. Wilson's program.

"I now come to the fifth point—settlement of all colonial claims and disputes. Practical realization of Mr. Wilson's principles in the realm of reality will encounter some difficulties in any case. I believe that for the present it may be left for England, which has the greatest colonial empire, to make what she will of this proposal of her ally. This point of the program also will have to be discussed in due time, on the reconstitution of the world's colonial possessions, which we also demand absolutely.

"Point 6: Evacuation of Russian territory: Now that the Entente has refused, within the period agreed upon by Russia and the Quadruple Alliance, to join in the negotiations, I must in the name of the latter decline to allow any subsequent interference. We are dealing here with questions which concern only Russia and the four allied powers. I adhere to the hope that, with recognition of self-determination for the peoples on the western frontier of the former Russian Empire, good relations will be established, both with these peoples and with the rest of Russia, for whom we wish most earnestly a return of order, peace, and conditions guaranteeing the welfare of the country.

"Point 7: Belgium: My predecessors in office repeatedly declared that at no time did the annexation of Belgium to Germany form a point in the program of German policy. The Belgian question belongs to those questions the details of which are to be settled by negotiation at the peace conference. So long as our opponents have unreservedly taken the standpoint that the integrity of the allies' territory can offer the only possible basis of peace discussion, I must adhere to the standpoint hitherto always adopted and refuse the removal in advance of the Belgian affair from the entire discussion.

"Point 8: The occupied parts of France are a valuable pawn in our hands. Here, too, forcible annexation forms no part of the official German policy. The conditions and methods of procedure of the evacuation, which must take account of Germany's vital interests are to be agreed upon between Germany and France.

"I can only again expressly accentuate the fact that there can never be a question of the dismemberment of imperial territory. Under no fine phrases of any kind shall we permit the enemy again to take from us territory of the empire which with ever-increasing intimacy has linked itself to Germanism, which has in highly gratifying manner ever and increasingly developed in an economic respect, and of whose people more than 87 per cent speak the German mother tongue.

"The questions dealt with by Mr. Wilson under points 9, 10, and 11 touch both the Italian frontier question and questions of the future development of the Austro-Hungarian monarchy and the future of the Balkan States; questions in which, for the greater part, the interests of our ally, Austria-Hungary, preponderate. Where German interests are concerned we shall defend them most energetically.

"But I may leave the answer to Mr. Wilson's proposals on these points in the first place to the Austro-Hungarian Foreign Minister. Close contact with the allied dual monarchy forms the kernel of our present policy, and must be the guiding line in the future. Loyal comradeship in arms, which has stood the test so brilliantly in wartime, must continue to have its effect in peace. We shall thus on our part do everything for the attainment of peace by Austria-Hungary which takes into account her just claims.

"The matters touched upon by Mr. Wilson in point 12 concern our loyal, brave ally, Turkey. I must in nowise forestall her statesmen in their attitude. The integrity of Turkey and the safeguarding of her capital, which is connected closely with the question of the Straits, are important and vital interests of the German Empire, also. Our ally can always count upon our energetic support in this matter.

"Point 13 deals with Poland. It was not the Entente—which had only empty words for Poland and before the war never interceded for Poland with Russia—but the German Empire and the Austro-Hungarian monarchy which liberated Poland from the Czaristic régime which was crushing her national characteristics. It may thus be left to Germany and Austria-Hungary and Poland to come to an agreement on the future constitution of this country. As the negotiations and communications of the last year prove, we are on the road to this goal.

"The last point, the 14th, deals with a bond of the nations. Regarding this point, I am sympathetically disposed, as my political activity shows, toward every idea which eliminates for the future a possibility or a probability of war, and will promote a peaceful and harmonious collaboration of nations. If the idea of a bond of nations, as suggested by President Wilson, proves on closer examination really to be conceived in a spirit of complete justice and complete impartiality toward all, then the Imperial Government is gladly ready, when all other pending questions have been settled, to begin the examination of the basis of such a bond of nations."

SCHEIDEMANN FOR PEACE BY AGREEMENT.—Replying to and criticising Count von Hertling's statement to the Main Committee, the Socialist leader Philip Scheidemann asserted that agreement was possible in at least 11 points of President Wilson's program. "Two chief arguments," he said: "were advanced by the military party for the prolongation of the war, namely, the success of the U-boats and the strength of our army. But these were to have given us a decisive victory in six months, according to the announcement made in 1916. Alas, that period has long since passed, and while the U-boat has admittedly harmed England enormously, its chief visible effect has been the entry of America into the war. If the United States had not entered the war we may be sure the Russian revolution would long ago have brought a general peace.

"What about the army? Suppose the army should capture Calais and Paris; would that mean peace? I say 'No!' Suppose the army conquered France and England; would that mean peace? I say 'No!' for we would still have to conquer America."

Herr Scheidemann fiercely attacked the militarist leaders, asserting that their attitude toward Austria was likely to lose for Germany her last friend.

"If our government leaders cannot free us from these 'patriots,'" said the Social Democratic leader, "they had better go. I warn them that if they do not bring us peace with Russia they will be hurled from power."

Herr Scheidemann held that an agreement was easily possible on 11 points of President Wilson's statement.

"But Mr. Wilson must be told plainly," the speaker said, "that Alsace is Germany's and will remain so. If one clear word is spoken regarding Belgium, England's war mongering will end. An honorable, complete reinstatement of Belgium is our duty.

"I cannot see the day," Herr Scheidemann went on, "when Germany will say to the Entente: 'We accept your terms. We are beaten.' But just as little can I see the day when England, France and the United States will say the same to us."—*N. Y. Times*, 27/1.

COUNT CZERNIN'S STATEMENT.—In his speech on January 24, before the Foreign Affairs Committee of the Hungarian Parliament, Count Czernin dealt chiefly with the prospects of peace with Russia, affirming that Austria, for her part, sought neither "a square meter nor a kreutzer from the Russians." His comment on the allies' peace terms was at first reported as follows:

"I think there is no harm in stating that I regard the recent proposals of President Wilson as an appreciable approach to the Austro-Hungarian point of view, and that to some of them Austria-Hungary joyfully could give her approval. But she must first lay down the principle—that in so far as these propositions concern her allies, whether in the case of Germany's possession of Belgium or in the case of Turkey, Austria-Hungary, faithful to her engagements to fight to the end in defence of her allies, will defend the possessions of her war allies as she would her own. That is the standpoint of our allies, in regard to which there is perfect reciprocity."

Count Czernin said as to the second point in President Wilson's peace aims, freedom of the seas, the President had responded to the views of all and that he (Czernin) absolutely and entirely supported this paragraph. Regarding paragraph 3 in President Wilson's proposals—the removal of economic barriers and the establishment of equality of trade conditions—Count Czernin said:

"This article, which pronounces in a formal manner hostility against a future economic war, is so just and reasonable, and its application so often has been urged by us, that we have nothing to add to it."

According to later reports, this early version was garbled. Count Czernin did not refer to Belgium as a *German possession*, and expressed a willingness on the part of Austria to fight only for the *pre-war* possessions of her allies. This vital section of his speech should read as follows:

"So far as these propositions concern her allies, whether in the case of German possessions, Belgium, or Turkey, Austria-Hungary, faithful to her engagements, will go to the extreme in defence of her allies. She will defend the pre-war possessions of her allies as she would her own."

SUPREME WAR COUNCIL ON GERMAN TERMS.—The Supreme War Council of the allies, which met at Versailles, made this official announcement in London on February 3, after its final session for the present:

"The council was unable to find in Count von Hertling's and Count Czernin's recent utterances any real approximation to the moderate conditions laid down by the Allied Governments. Under the circumstances, the council decided that the only task before them to meet was the vigorous and effective prosecution of the war until the pressure of that effort produced a change of temper in the enemy governments justifying the hope of the conclusion of peace based on the principles of freedom, justice, and respect for international law. The council arrived at a complete unanimity of policy on measures for the prosecution of the war."

Generals Tasker H. Bliss, chief of staff, and John J. Pershing, U. S. A., represented our government at the meeting.

PRESIDENT WILSON'S REVIEW OF PEACE TERMS.—President Wilson in an address to Congress on February 11, analyzed the replies of the Central Powers and again outlined the conditions essential to an acceptable peace. He refused to accept Count von Hertling's proposal to confine territorial settlements to the countries immediately concerned. He pointed out that if territorial questions were so settled by separate bargains, separate economic and trade compacts would also be in order. In conclusion he laid down four general principles, requiring in substance that all territorial settlements should be made with the utmost regard for the national aspirations and the benefit of the populations concerned. The address follows in full:

Gentlemen of the Congress:

On January 8 I had the honor of addressing you on the objects of the war as our people conceive them. The Prime Minister of Great Britain had spoken in similar terms on January 5. To these addresses the German Chancellor replied on January 24, and Count Czernin for Austria on the same day. It is gratifying to have our desire so promptly realized that all exchanges of view on this great matter should be made in the hearing of all the world.

Count Czernin's reply, which is directed chiefly to my own address on January 8, is uttered in a very friendly tone. He finds in my statement a sufficiently encouraging approach to the views of his own government to justify him in believing that it furnishes a basis for a more detailed discussion of purposes by the two governments.

He is represented to have intimated that the views he was expressing had been communicated to me beforehand and that I was aware of them at the time he was uttering them; but in this I am sure he was misunderstood. I had received no intimation of what he intended to say. There was, of course, no reason why he should communicate privately with me. I am quite content to be one of his public audience.

Count von Hertling's reply is, I must say, very vague and very confusing. It is full of equivocal phrases and leads it is not clear where. But it is certainly in a very different tone from that of Count Czernin, and apparently of an opposite purpose. It confirms, I am sorry to say, rather than removes the unfortunate impression made by what we had learned of the conferences at Brest-Litovsk.

His discussion and acceptance of our general principles lead him to no practical conclusions. He refuses to apply them to the substantive items which must constitute the body of any final settlement. He is jealous of international action and of international council. He accepts, he says, the principle of public diplomacy, but he appears to insist that it be confined, at any rate in this case, to generalities, and that the several particular questions of territory and sovereignty, the several questions upon whose settlement must depend the acceptance of peace by the 23 states now engaged in the war, must be discussed and settled, not in general council, but several by the nations most immediately concerned by interest or neighborhood.

He agrees that the seas should be free, but looks askance at any limitation to that freedom by international action in the interest of the common order. He would without reserve be glad to see economic barriers removed between nation and nation, for that could in no way impede the ambitions of the military party, with whom he seems constrained to keep on terms. Neither does he raise objection to a limitation of armaments. That matter will be settled of itself, he thinks, by the economic conditions which must follow the war. But the German colonies, he demands, must be returned without debate. He will discuss with no one but the representatives of Russia what disposition shall be made of the peoples and the lands of the Baltic provinces; with no one but the Government of France the "condi-

tions" under which French territory shall be evacuated; and only with Austria what shall be done with Poland.

In the determination of all questions affecting the Balkan States he defers, as I understand him, to Austria and Turkey; and with regard to the agreements to be entered into concerning the non-Turkish peoples of the present Ottoman Empire, to the Turkish authorities themselves. After a settlement all around, effected in this fashion, by individual barter and concession, he would have no objection, if I correctly interpret his statement, to a league of nations which would undertake to hold the new balance of power steady against external disturbance.

It must be evident to every one who understands what this war has wrought in the opinion and temper of the world that no general peace, no peace worth the infinite sacrifices of these years of tragical suffering, can possibly be arrived at in any such fashion. The method the German Chancellor proposes is the method of the Congress of Vienna. We cannot and will not return to that.

What is at stake now is the peace of the world. What we are striving for is a new international order based upon broad and universal principles of right and justice—no mere peace of shreds and patches. Is it possible that Count von Hertling does not see that, does not grasp it, is, in fact, living in his thought in a world dead and gone? Has he utterly forgotten the Reichstag resolutions of July 19, or does he deliberately ignore them? They spoke of the conditions of a general peace, not of national aggrandizement or of arrangements between state and state.

The peace of the world depends upon the just settlement of each of the several problems to which I adverted in my recent address to the Congress. I, of course, do not mean that the peace of the world depends upon the acceptance of any particular set of suggestions as to the way in which those problems are to be dealt with. I mean only that those problems each and all affect the whole world; that unless they are dealt with in a spirit of unselfish and unbiased justice, with a view to the wishes, the natural connections, the racial aspirations, the security and peace of mind of the peoples involved, no permanent peace will have been attained.

They cannot be discussed separately or in corners. None of them constitutes a private or separate interest from which the opinion of the world may be shut out. Whatever affects the peace affects mankind, and nothing settled by military force, if settled wrong, is settled at all. It will presently have to be reopened.

Is Count von Hertling not aware that he is speaking in the court of mankind, that all the awakened nations of the world now sit in judgment on what every public man, of whatever nation, may say on the issues of a conflict which has spread to every region of the world? The Reichstag resolutions of July themselves frankly accepted the decisions of that court. There shall be no annexations, no contributions, no punitive damages. Peoples are not to be handed about from one sovereignty to another by an international conference or an understanding between rivals and antagonists. National aspirations must be respected; peoples may now be dominated and governed only by their own consent. "Self-determination" is not a mere phrase. It is an imperative principle of action, which statesmen will henceforth ignore at their peril.

We cannot have general peace for the asking or by the mere arrangements of a peace conference. It cannot be pieced together out of individual understandings between powerful states. All the parties to this war must join in the settlement of every issue anywhere involved in it, because what we are seeking is a peace that we can all unite to guarantee and maintain, and every item of it must be submitted to the common judgment whether it be right and fair, an act of justice, rather than a bargain between sovereigns.

The United States has no desire to interfere in European affairs or to act as arbiter in European territorial disputes. She would disdain to take

advantage of any internal weakness or disorder to impose her own will upon another people. She is quite ready to be shown that the settlements she has suggested are not the best or the most enduring. They are only her own provisional sketches of principles, and of the way in which they should be applied.

But she entered this war because she was made a partner, whether she would or not, in the sufferings and indignities inflicted by the military masters of Germany against the peace and security of mankind; and the conditions of peace will touch her as nearly as they will touch any other nation to which is intrusted a leading part in the maintenance of civilization. She cannot see her way to peace until the causes of this war are removed, its renewal rendered, as nearly as may be, impossible.

This war had its roots in the disregard of the rights of small nations and of nationalities which lacked the union and the force to make good their claim to determine their own allegiances and their own forms of political life. Covenants must now be entered into which will render such things impossible for the future; and those covenants must be backed by the united force of all the nations that love justice and are willing to maintain it at any cost.

If territorial settlements and the political relations of great populations which have not the organized power to resist are to be determined by the contracts of the powerful governments which consider themselves most directly affected, as Count von Hertling proposes, why may not economic questions also? It has come about in the altered world in which we now find ourselves that justice and the rights of peoples affect the whole field of international dealing as much as access to raw materials and fair and equal conditions of trade.

Count von Hertling wants the essential bases of commercial and industrial life to be safeguarded by common agreement and guarantee, but he cannot expect that to be conceded him if the other matters to be determined by the articles of peace are not handled in the same way as items in the final accounting. He cannot ask the benefit of common agreement in the one field without according it in the other. I take it for granted that he sees that separate and selfish compacts with regard to trade and the essential materials of manufacture would afford no foundation for peace. Neither, he may rest assured, will separate and selfish compacts with regard to provinces and peoples.

Count Czernin seems to see the fundamental elements of peace with clear eyes, and does not seek to obscure them. He sees that an independent Poland, made up of all the indisputably Polish peoples who lie contiguous to one another, is a matter of European concern, and must, of course, be conceded; that Belgium must be evacuated and restored, no matter what sacrifices and concessions that may involve; and that national aspirations must be satisfied, even within his own empire, in the common interest of Europe and mankind.

If he is silent about questions which touch the interest and purpose of his allies more nearly than they touch those of Austria only, it must, of course, be because he feels constrained, I suppose, to defer to Germany and Turkey in the circumstances. Seeing and conceding, as he does, the essential principles involved and the necessity of candidly applying them, he naturally feels that Austria can respond to the purpose of peace as expressed by the United States with less embarrassment than could Germany. He would probably have gone much further had it not been for the embarrassments of Austria's alliances and of her dependence upon Germany.

After all, the test of whether it is possible for either government to go any further in this comparison of views is simple and obvious. The principles to be applied are these:

First—That each part of the final settlement must be based upon the essential justice of that particular case and upon such adjustments as are most likely to bring a peace that will be permanent.

Second—That peoples and provinces are not to be bartered about from sovereignty to sovereignty as if they were mere chattels and pawns in a game, even the great game, now forever discredited, of the balance of power; but that,

Third—Every territorial settlement involved in this war must be made in the interest and for the benefit of the populations concerned, and not as a part of any mere adjustment or compromise of claims among rival states; and,

Fourth—That all well-defined national aspirations shall be accorded the utmost satisfaction that can be accorded them without introducing new or perpetuating old elements of discord and antagonism that would be likely in time to break the peace of Europe, and consequently of the world.

A general peace erected upon such foundations can be discussed. Until such a peace can be secured we have no choice but to go on. So far as we can judge, these principles that we regard as fundamental are already everywhere accepted as imperative except among the spokesmen of the military and annexationist party in Germany. If they have anywhere else been rejected, the objectors have not been sufficiently numerous or influential to make their voices audible. The tragical circumstance is that this one party in Germany is apparently willing and able to send millions of men to their death to prevent what all the world now sees to be just.

I would not be a true spokesman of the people of the United States if I did not say once more that we entered this war upon no small occasion and that we can never turn back from a course chosen upon principle. Our resources are in part mobilized now, and we shall not pause until they are mobilized in their entirety. Our armies are rapidly going to the fighting front, and will go more and more rapidly. Our whole strength will be put into this war of emancipation—emancipation from the threat and attempted mastery of selfish groups of autocratic rulers—whatever the difficulties and present partial delays.

We are indomitable in our power of independent action, and can in no circumstances consent to live in a world governed by intrigue and force. We believe that our own desire for a new international order, under which reason and justice and the common interests of mankind shall prevail, is the desire of enlightened men everywhere. Without that new order the world will be without peace and human life will lack tolerable conditions of existence and development. Having set our hand to the task of achieving it, we shall not turn back.

I hope that it is not necessary for me to add no word of what I have said is intended as a threat. That is not the temper of our people. I have spoken thus only that the whole world may know the true spirit of America—that men everywhere may know that our passion for justice and for self-government is no mere passion of words, but a passion which, once set in motion, must be satisfied. The power of the United States is a menace to no nation or people. It will never be used in aggression or for the aggrandizement of any selfish interest of our own. It springs out of freedom and is for the service of freedom.

LLOYD GEORGE SEES NO GENUINE PEACE.—London, February 12.—Addressing the House of Commons to-day at its reassembling after prorogation last week, Premier Lloyd George said he had read with profound disappointment the replies given to President Wilson and to the declarations of the British Government by Count von Hertling and Count Czernin, and added that it was perfectly true that, as regarded the tone, there was a great deal of difference between the two speeches, and he wished he could believe there was a difference in substance, but when there was a question of considering the real demands of the allies, he said, Count Czernin was adamant.

He remarked that he would like any member to point out anything in the speeches of Count Czernin or Count von Hertling which could possibly be

regarded as proof that the Central Powers were prepared to make peace on terms which could be regarded as just and reasonable.

Germany's action regarding Russia, he said, proved that her declaration regarding no annexations had no real meaning. No answer had been given regarding Belgium that could be regarded as satisfactory, he declared; no answer had been given regarding Poland or France, with her legitimate claims for the restoration of her lost provinces; not a word had been said about the thousands of the Italian race and tongue now under the Austrian yoke.

Until there was some better proof than had been provided in the speeches to which he referred that the Central Powers were prepared to consider the aim and ideals for which the allies were fighting, said Mr. Lloyd George, it would be the nation's regrettable duty to go on and make preparations necessary in order to establish international rights.

The Premier said the government stood by the considered declaration made at the meetings with the trade union representatives early this year. It did not recede in the least from its war aims as they had been stated. It was no use, he said, crying peace when there was no peace.—*N. Y. Times*, 13/2.

FURTHER DISCUSSION TO FOLLOW.—It was announced from Berlin that Count von Hertling would take up the Ukraine Peace Treaty and President Wilson's message during the Reichstag sessions beginning February 21.

PEACE WITH UKRAINE

In the peace negotiations at Brest-Litovsk, the representatives of the Central Powers deprived the Bolshevik commissioners of the chief card in their hands—Russian food supplies—by negotiating a separate peace with the newly formed republic of Ukrainia, comprising within its tentative boundaries one-third of the agricultural lands of Russia. The advantage to the Central Powers of this policy of separatism in Russia is obvious, since it not only divides the country into warring factions, but enables the Central Powers to conclude advantageous commercial and economic bargains with the weak states thus formed. The agreement with Ukrainia, however, created some difficulties, since the cession to the new state of the small district of Cholm in Russian Poland raised the hot antagonism of all Polish elements within the two empires. Furthermore, at the time of the treaty a struggle was still going on in Ukrainia between the bourgeois government under the Rada or legislative assembly, and the rival government set up by the Bolsheviki.

The treaty, which was signed February 8, established the old Austro-Russian frontier as the western boundary of the new state and gave it a liberal northern frontier at the expense of the rest of Russia. In particular, the treaty provided rates of exchange and other agreements for reopening trade. The terms of the treaty are in part as follows:

The treaty is entitled: "A Treaty of Peace Between Germany, Austria-Hungary, Bulgaria, and Turkey on one Part and the Ukrainian People's Republic on the Other."

The preamble states that the Ukrainian people, having in the course of the present world war declared itself to be independent and expressed a wish to restore peace between itself and the powers at war, desires "to take the first step toward a lasting world's peace, honorable to all parties, which shall not only put an end to the horrors of war, but also lead to the

restoration of friendly relations of the peoples in political, legal, economic, and intellectual realms."

The names of all of the plenipotentiaries engaged in the negotiations are then set forth, and they are declared to have reached an agreement on the following points:

Article I.—Germany, Austria-Hungary, Bulgaria, and Turkey on the one hand and the Ukrainian People's Republic on the other declare that the state of war between them is at an end. The contracting parties are resolved henceforth to live in peace and friendship with one another.

Article II.—Between Austria-Hungary on the one hand and the Ukrainian People's Republic on the other hand, as far as these two powers border one another, those frontiers will exist which existed before the outbreak of the present war between the Austro-Hungarian monarchy and Russia. Further north the frontier of the republic beginning at Tarnegrad will in general follow the line of Bilgerey to Sroezeberzszyn, Krasnostau, Pugaszce, Radzyn, Meshiretschei, Sarnaki, Selnik, Wysekelitowsk, Kamietslitowsk, Prushany, and Wydozowskyesee. This will be fixed in detail by a mixed commission according to ethnographical conditions and with a regard to the desires of the population. Should the Ukrainian People's Republic yet have common frontiers with another of the powers of the Quadruple Alliance, special agreements will be made thereon.

Article III.—The evacuation of occupied territories will begin immediately after the ratification of the present treaty. The manner of carrying out the evacuation and transfer of the evacuated territories will be determined by the plenipotentiaries of the interested parties.

Article IV.—The diplomatic and consular relations between the contracting parties will be entered upon immediately after the ratification of the peace treaty. The widest possible admittance of the respective parties to Consuls is to be reserved for a special agreement.

Article V.—The contracting parties mutually renounce the reimbursement of their war costs—that is to say, the state expenditure for carrying on the war, as well as indemnification for damages—that is to say, those damages suffered by them and their subjects in the war, as through military measures, including all requisitions made in the enemy's countries.

Article VI.—The respective prisoners of war will be permitted to return home, and, as far as they do not desire, with the approval of the state concerned, to remain in its territories or proceed to another country. The regulation of the questions connected herewith will follow by means of separate treaties provided for in Article VIII.

Article VII.—The contracting parties undertake mutually and without delay to enter into economic relations and organize an exchange for goods on the basis of the following prescriptions:

1. Until the 31st day of July of the current year reciprocal exchange of the more important surplus supplies of agricultural and industrial products will be carried out as follows for the purpose of covering current requirements: The quantities and sorts of products to be exchanged will be settled by a joint commission, to sit immediately upon the signature of the peace treaty. Prices will be regulated by the joint commission. Payments will be made in gold on the basis of 1000 German imperial gold marks as the equivalent of 462 gold rubles of the former Russian Empire, or 1000 Austro-Hungarian gold kroner as the equivalent of 393 rubles, 78 kopeks of the former Russian Empire. The exchange of goods fixed by the joint commission aforementioned, which commission will consist of equal numbers of representatives of both parties, will take place through state central bureaus. The exchange of those products which are not fixed by the aforementioned commission will take place by the way of free trade, according to the stipulation of a provisional commercial treaty.

2. So far as it is not otherwise provided, the economic relations between the contracting parties shall continue provisionally, and in any case until the conclusion of a final commercial treaty. But until the termination of

a period of at least six months after the conclusion of peace between the Central Powers on the one part and the European states at war with the Central Powers, as well as the United States and Japan on the other part, certain prescriptions are laid down as a basis of relations.

From N. Y. Times, Feb. 17

DISMEMBERED RUSSIA.

As regards economic relations between Germany and Ukraine the text of the treaty prescribes what parts of the Russo-German commercial and shipping treaties of 1894 and 1904 shall be put into force. The contracting parties further agree to maintain the general Russian customs tariff of January 13, 1903.

The treaty also provides (Section 3) which parts of the Austro-Hungarian-Russian commercial and shipping treaty of February 5, 1906, shall be maintained, and adds:

All parties agree that all articles transported across the territory of either party shall be free of duty. Trade-mark agreements are resumed, and the contracting parties agree to support each other in restoring railway tariffs. Economic relations between Bulgaria and Turkey and Ukraine are to be settled according to the most favored nation definition until definite commercial treaties are concluded.

If the period provided for in the first paragraph of Section 2 should not occur before June 30, 1919, each of the two contracting parties is free from June 30, 1919, to give six months' notice to terminate the prescriptions contained in the above-mentioned section.

Articles 4 and 5 provide that neither party shall claim preferential treatment such as conferred upon some third adjoining country by customs alliance, and that all importation restrictions shall be removed on goods of either party stored in neutral states.

Article VIII.—Restoration of public and private legal relations, the exchange of prisoners of war and interned civilians, the question of amnesty and the question of the treatment of merchantmen in enemy hands will be regulated in separate treaties with the Ukrainian People's Republic, to form an essential part of the present peace treaty, which, so far as practicable, will take effect simultaneously therewith.

Article IX.—The agreements made in this peace treaty form an indivisible whole.

Article X.—For the interpretation of this treaty the German and Ukrainian texts are authoritative in regard to relations between Germany and Ukraine, the German, Hungarian, and Ukrainian texts for relations between Austria-Hungary and Ukraine, the Bulgarian and Ukrainian texts for relations between Bulgaria and Ukraine, the Turkish and Ukrainian texts for relations between Turkey and Ukraine.

The concluding part of the treaty provides:

"The present peace treaty will be ratified. Ratified documents shall be exchanged as soon as possible. So far as there are no provisions to the contrary, the peace treaty shall come into force on ratification."

The supplementary treaties provided for in Article VIII, also were signed. They cover the following points:

Restoration of consular relations.

Restoration of state treaties.

Restoration of civil law.

Indemnification for civil damages caused by laws of war or by acts contrary to international law.

Exchange of war prisoners and interned civilians.

Care of burial grounds of those fallen in enemy territory.

Provision for the return to their homes of persons affected by the treaty.

Treatment of merchant vessels in enemy hands.

The Brest-Litovsk dispatch says that the text of the supplementary agreements must be withheld for the present to avoid overcrowding the telegraph wires.

POPULATION AND RESOURCES OF UKRAINE

The population of Ukraine consists of about 28,000,000 Ruthenians, or Little Russians, speaking a dialect differing from Great Russian as Lowland Scotch from English. Three million members of the same race inhabit the Austrian province of Galicia. The old régime in Russia opposed every nationalistic aspiration on the part of the Ukrainians, denying the Little Russian dialect any official status in court or schools. As a result, in spite

of the fact that the Poles have been favored at the expense of the Ruthenians in Galicia, there has been a flourishing pro-Austrian propaganda within the Ukraine which has facilitated the present outcome.

The Ukrainian movement in Russia is partly national and partly a land question. The Bolsheviki, who believe in a redistribution of land, emphasize the latter; the Rada group stand alone on their separate and proclaimed nationality.

Both questions, however, are of as great importance to Austria-Hungary as they are to Russia, for the Ukraine include not only the southeastern provinces of Russia, but a large portion of territory in East Galicia, in Northeastern Hungary and in Bukovina, and in the latter territories the national character of the movement is most pronounced. This is in the main due to the policy of the Austrian Government before the war, which favored the Ukrainians of East Galicia in proportion as the old Russian Government persecuted them. The result was that Lemberg became the intellectual center of the Ukrainians where refugees from Kiev found a ready welcome.

Just a month after the March revolution in Petrograd, the Ukrainian National Congress was opened at Kiev. It confined itself to a proclamation of national territorial and political entity and provided for the election of the Rada. The election was held immediately, and the Rada, from a National Council, later transformed itself into a legislature under the presidency of Professor Hrushevski.

When the Provisional Government collapsed the Rada lost no time in grasping the situation. Its first act was to attempt to prevent the spread of Bolshevism in the Ukraine; its second was to present its nationalist question to the Central Powers and attempt to negotiate peace on that basis in exchange for the vast stores of wheat and other supplies which had been collected at Kiev and neighboring cities for the use of the Southern Russian armies.

On November 20 the government of the Ukraine was entirely reconstructed on democratic lines, with Socialist proclivities. Its president was M. Vinnitchenko, himself a Social Democrat. Professor Hrushevski was still president of the Rada. Warned by the fate of Kerensky, the government pursued what it called a "Nationalist Democratic" course, supported by, but not recognizing, the bourgeoisie on the one hand and on the other opposing the extreme demands of the Bolsheviki.

The new republic, if it can maintain its existence, will control about 850,000 square kilometers, with Kiev as its chief city, and the port of Odessa on the Black Sea, through which, before the war, 70 per cent of Russia's exports were shipped. Ukraine, comprising one-sixth of European Russia, has 32 per cent of all the farm land, about 60 per cent of the iron mines, 75 per cent of the coal, and in peace time about 30,000,000 head of cattle.

One difficulty in developing trade with the Central Powers will be the present disorganization of the country and lack of railroad facilities, there being but one or two rail routes across the border, with a change of gauge at the frontier. Upon peace with Roumania, goods could be shipped by way of the Danube.

OPPOSITION OF THE POLES.—The Austrian Poles, furious "at the violation of the national unity" by the peace with the Ukraine and the old Polish territory thereby handed over to the Little Russians, are uniting with the Czechs, Italians, Rumanes, and South Slavs. In parliament these anti-German elements slightly exceed the government bloc. The Social

Democrats hold the balance of power, and they are expected to use it to overthrow the government. Meanwhile, in Cracow, which still remembers its part in the Polish insurrections of 1830 and 1846, the peace with the Ukraine is celebrated by the displays of black flags, insulting the festivity at Vienna. The position of the Austrian Government has been ticklish for a long time. The bitterness and the independent policy of Czechs, Slavs, Slovenes, Slovaks, Poles against that government have been steadily increasing. The worse the plight of Austria the sharper the demands of the discontented nationalities.—*N. Y. Times*, 17/2.

COUNT CZERNIN ON UKRAINE PEACE.—Amsterdam, February 15.—A dispatch received here from Vienna says that Count Czernin spoke as follows of the treaty with Ukraine:

"What has happened at Brest-Litovsk," Count Czernin said, "is not yet the end of the war, but it is the beginning of the end. Not only political diseases but political recoveries are infectious, and peace will be so, too.

"Moreover, the strangling blockade of the Entente has been broken by the signing of the peace with the Ukraine, with its bread. The difficulties of transport certainly still are considerable, but all necessary preparations have been made, and, if conditions do not alter, an improvement will take place."

Count Czernin added that he had assurances that Austrian prisoners of war would be released. Civil war between Russia and the Ukraine might cause difficulties, but he was full of hope. In conclusion Count Czernin said:

"If ever confidence was justified, it is to-day. I am firmly convinced that we have only to hold out a little longer and an honorable general peace will be attained."—*N. Y. Times*, 16/2.

TROTZKY BREAKS OFF NEGOTIATIONS

On February 10, following the peace treaty with Ukraine, negotiations ended between the Bolsheviki and the Central Powers, Leon Trotzky refused to accept the terms offered by Germany, but at the same time declared Russia out of the war. The following official statement was issued explaining the attitude of the Bolshevist Government.

The peace negotiations are at an end. The German capitalists, bankers, and landlords, supported by the silent co-operation of the English and French bourgeoisie, submitted to our comrades, members of the peace delegations at Brest-Litovsk, conditions such as could not be subscribed to by the Russian revolution.

The governments of Germany and Austria possess countries and peoples vanquished by force of arms. To this authority the Rusian people, workmen and peasants, could not give its acquiescence. We could not sign a peace which would bring with it sadness, oppression, and suffering to millions of workmen and peasants.

But we also cannot, will not, and must not continue a war begun by Czars and capitalists in alliance with Czars and capitalists. We will not and we must not continue to be at war with the Germans and Austrians —workmen and peasants like ourselves.

We are not signing a peace of landlords and capitalists. Let the German and Austrian soldiers know who are placing them in the field of battle and let them know for what they are struggling. Let them know also that we refuse to fight against them.

Our delegation, fully conscious of its responsibility before the Russian people and the oppressed workers and peasants of other countries declared on February 10, in the name of the Council of the People's Commissaries of the government of the Federal Russian Republic to the governments of

the peoples involved in the war with us and of the neutral countries, that it refused to sign an annexationist treaty. Russia, for its part, declares the present war with Germany and Austria-Hungary, Turkey, and Bulgaria at an end.

Simultaneously, the Russian troops receive an order for complete demobilization on all fronts.

The signatures of Leon Trotzky and other members of the delegation are appended.

FUTURE COURSE OF GERMANY.—In spite of the bewildering situation created by the action of Trotzky, it appeared clear from despatches of February 17 that Germany would require military forces to maintain her eastern line, and that she would be called upon to give military support to the Ukraine. At this date Germans and pro-Germans in Russia were being arrested, and the German commission at Petrograd found it difficult to continue negotiations for the exchange of prisoners.

Austria manifested an unwillingness to take further part in hostilities against Russia.

RUMANIA

Despatches of February 10 stated that Field Marshal von Mackensen had sent an ultimatum to the Rumanian Government on February 6 demanding that peace negotiations be entered upon within four days. Newspaper discussion in Germany indicated a possible policy on the part of the government to offer Rumania compensation in the Russian territory of Bessarabia for the loss of Dobrudja to Bulgaria.

The resignation of the veteran Premier of Rumania, Bratiano, was reported on January 28, and was explained as the result of disagreement between liberal and conservative factions within the cabinet. Despatches of February 15 announced a non-partisan ministry under General Averescu, former Minister of War, and lately commander in Dobrudja.

As a result of the occupation of parts of Bessarabia by Rumanian forces and hostility to Bolshevist propaganda on the part of Rumania, the Bolshevist Government on January 26 announced that diplomatic relations with Rumania were broken off, and that the Rumanian gold reserves in Moscow, amounting to 1,200,000,000 rubles, were to be seized.

SECRET DOCUMENTS PUBLISHED

The N. Y. *Evening Post* of January 25, 26, and 28 published a series of secret agreements, telegrams, memoranda, etc., exchanged between the Western Powers and the old régime in Russia. These had been thrown before the world by the Bolsheviki as evidence in their case against the ruling powers in both groups of belligerents. While the documents reveal the pitfalls and evils of secret diplomacy, it is difficult to see how the Entente could have united and increased its strength without such bargaining. There is little in the documents that has not been for some time a matter of common knowledge or general suspicion.

Foreign Minister Trotzky contributes a preface condemning secret diplomacy as part and parcel of "imperialistic rapaciousness" and the "domination of capital." The contents may be listed as follows:

1. The Entente agreement with Italy (May, 1915) pledging military and naval cooperation, recognizing Italy's *irridenta* claims in Trent, Istria, and Dalmatia, and promising a loan from England of at least £50,000,000.

2. A memorandum from General Polivanof on the effect of Rumania's military defeat upon her territorial claims (November, 1916).

3. A confidential memorandum of offers to Greece of territory in southern Albania and Asia Minor (November, 1915–May, 1916).

4. An agreement for the future division of Asia Minor and the Near East (February 21, 1917).

5. Telegram from Sazanoff to Russian Ambassadors referring to future territorial adjustments and a project for excluding Germany from trade with China.

6. Telegram from Russian Foreign Office agreeing to French proposals for restoration of Alsace and neutralization of territory west of the Rhine (January 30, 1917).

7. Agreement to Russian control of Constantinople and the Dardanelles, with Constantinople a free port, and freedom of passage for merchant vessels through the straits (March 4, 1915).

8. Report of a conference of bankers from the Central Powers and the Entente at Berne in September, 1917, at which the German delegates proposed peace terms at the expense of Russia. Following the conference, according to a telegram from the Russian *chargé* at Berne, "an Anglo Jewish financier stated that the German aim was to promote separation in Russia so far as possible, so as to split her up into small states. For Germany it will be easy to conclude commercial treaties with weaker states (Lithuania, Courland, etc.).

9. A series of telegrams from Foreign Minister Tereschenko to Russian diplomats abroad explaining changes in the Russian situation (August October, 1917).

GERMANY

LABOR DISTURBANCES SUPPRESSED BY MILITARY FORCE.—During the last week in January strikes and peace riots broke out in Germany and spread with great rapidity, crippling the great war industries and threatening the government. At Hamburg the laborers in the Vulcan Works struck on Monday, January 27. At Kiel the workmen in government and private shipyards went out. It was estimated that there were nearly 500,000 strikers in Berlin alone.

The movement was under the control of Socialist leaders of both the majority and independent factions. A "Workmen's Council" was formed, with an "action commission" of 10 members including Haase, Scheidemann, Ledebour, Dittmann and other Socialist leaders. At the court martial of Dittmann, according to an Amsterdam despatch of February 6, he declared that the uprising was "a demonstration strike against a peace of annexations and in favor of a peace by understanding."

"If the government had entered into negotiations as requested," Dittmann testified, "the strike would have lasted only three days." Scheidemann supported Dittmann's testimony as to the political purpose of the strike. Dittmann was sentenced to five years' confinement for inciting to high treason.

The disturbances were in the nature of a counter-demonstration against the propaganda of the Fatherland or Pan-German party. Meetings of this party at Munich, Stuttgart, and elsewhere were broken up by hostile masses. At Munich, according to the *Tägliche Rundschau*, the singing of "Deutschland Ueber Alles" was drowned out by a crowd shouting the "Marseillaise." The following demands were addressed by the strikers to the government:

1. Accelerated conclusion of a general peace without indemnities or annexations.
2. Participation of workmen's delegates of all the countries in the peace pourparlers.
3. Amelioration of the food situation by better distribution.
4. Immediate abolition of the state of siege and restoration of the right of public meetings suspended by the military authorities.
5. Abolition of militarization of war factories.
6. Immediate release of all political prisoners.
7. Fundamental democratization of state institutions.
8. The institution of equal electoral suffrage by direct or secret ballot.

The strike movement was crushed within a week's time by strong military measures—declaration of martial law, arrest of strikers, and court martial of the leaders.

AMSTERDAM, February 4.

Although the German strike appears to be a pretty complete failure, nevertheless it will not remain without consequences. The attitude of the strikers and those who remained outside the movement is certain to be made more bitter.

Once more it has been impressed upon German workers that they live under a system which is little better than a military dictatorship. They will not fail to note the difference between the action of the German Government and that of the Austrian authorities. In Germany the government clamped down all freedom, refused to have anything to do with the workers, and left the military to put down the movement by force. Not for a minute did justice to the workers' demands influence the government. —*N. Y. Times*, 6/2.

AUSTRIA

STRIKES AND FOOD RIOTS.—On January 18 a general strike was proclaimed in Austria, 100,000 men quitting work in Vienna and Neustadt. While the strike was precipitated by the reduced flour ration, the delegates of the workmen informed the government that "the demand for peace took precedence over other demands."

The labor agitation in Austria excited great interest and expectation abroad, but it appears that it lasted not more than two or three days and was ended by consultations between the workmen and the government, after which the strikers went back to work.

The N. Y. *Herald* of February 7 wrote as follows:

"In the latest despatches there are intimations that the Austrian strike situation is clearing, the government having indicated its willingness to

accede to the surface demands of the strikers. That is not unlikely, and yet we may be just at the beginning of the wider agitation of which the strikes are an advance manifestation.

"More significant of a real situation in the dual monarchy than reports of happenings there which come by either of the long way around routes is the comment of the German press. *Vorwaerts* calls upon the German Government to negotiate peace on the Czernin program announced at Brest-Litovsk and is promptly suppressed. The *Tägliche Rundschau* charges the Austrian Government with promoting the "democratic internationalism" that in turn is assumed to have promoted the strikes throughout Austria-Hungary, while the *Frankfurter Zeitung* intimates that the strike situation is of Count Czernin's "stage management." The German press as a whole is critical. Austria-Hungary is reminded that its armies would have been wiped out except for German leadership and German support, and is taunted with lack of gratitude—which is rubbing salt into the open wound."

SEYDLER CABINET RESIGNS.—Amsterdam, February 8.—Dr. von Seydler, the Austrian Premier, has offered the resignation of his entire cabinet to Emperor Charles, according to a dispatch from Vienna.

The resignation of the cabinet, it is understood in parliamentary circles in Vienna, is due to the opposition of Polish Deputies to special debates and the provisional budget. The opposition of the Deputies makes a majority for the budget doubtful.

The cabinet of Dr. von Seydler, which was formed last June, was reported to have resigned while the recent labor crisis was on in Austria-Hungary. This report was not confirmed.

Dr. von Seydler was able to bring about the cessation of the strike by informing labor delegations on January 20 that it was the wish of the Austrian Emperor to end the war at the earliest possible moment by an honorable peace. Other members of his government promised labor and military reforms, after which the labor leaders ordered their followers to return to work. This virtually ended the strikes in Vienna.

The cabinet of Dr. von Seydler was of a stop-gap bureaucratic character, organized after it had been found impossible to form a ministry which could work with the Austrian parliament on a positive program of internal reform and reorganization.—*N. Y. Times*, 9/2.

UNITED STATES

ALL U. S. EXPORTS AND IMPORTS UNDER LICENSE.—By a sweeping proclamation issued February 15, President Wilson made subject to control by license the entire foreign commerce of the United States. The object of the proclamation was to release ships for the transport service to France, and it is estimated that at least 1,000,000 additional tons will be made available.

Trade with South America and the Orient will be largely affected, according to a statement of the War Trade Board on February 15. The action was decided upon finally when agreements with Holland and some of the other neutral nations of Europe brought within the control of the government 500,000 tons or more of shipping, which is not to be sent into the submarine zone. French sailing ships will also be used to take the place of some of the diverted American tonnage, and the general result will be the withdrawal within a comparatively short time of all American tonnage fit for overseas service from coastwise South American and Pacific trade.

It is possible also that with the reduction of trade between the United States and nations in the Orient, additional Japanese tonnage will be brought into the transatlantic service, thus contributing more directly to the war.

SHIPPING AGREEMENT WITH HOLLAND.—In London M. van Vollenhoven, special commissioner for Holland, and Charles H. Sherrill of the American War Trade Board, who represents all the allied governments, are completing details of an allied-Dutch agreement concerning Dutch shipping for the allies and allied food and other supplies for Holland. Holland is to receive rations of foodstuffs and industrial materials based on the known necessities of the country subject to the world shortage of food and raw stuffs. These will be carried in Dutch vessels. The entire residue of the Dutch merchant marine will then be placed at the allies' disposal for transportation needs outside the war and danger zone.—*N. Y. Times*, 12/2.

TRADE AGREEMENTS WITH NORTHERN NEUTRALS.—Our government's new trade agreement with Sweden, parts of which have been signed at London, completes the list of such compacts with the northern European neutrals. It follows acceptance of the War Trade Board's terms by Switzerland, Denmark, Finland, Holland, and Norway. Some of the Swedish ships lying at our ports will unload their cargoes and then, under charter to our government, go into the trade with South America. A few will be permitted to carry supplies to Sweden. A final decision as to the quantity and character of these has not been reached, and the terms soon to be accepted are not published. Undoubtedly they forbid the sale of food or metals to our enemies. Until a few months ago Germany was importing from Sweden large quantities of high-grade iron to be used in her munition factories.

All the northern neutral countries from which Germany in 1916 received food enough to support her entire army on the west front are now assenting to the blockade designed to deprive her of imported food, metals, and other essential products.—*N. Y. Times*, 31/1.

REVIEW OF BOOKS

ON

SUBJECTS OF PROFESSIONAL INTEREST

"Naval Power in the War." By Lieut. Commander C. C. Gill, U. S. Navy. Price $1.25 net. (New York: Geo. H. Doran Company.)

This book is a contemporaneous history of the naval aspect of the war and is written not so much with a view toward completeness in detail as with the idea of bringing out the necessary points of naval policy, strategy and tactics. The text had its origin in a series of lectures delivered by Lieut. Commander Gill to the midshipmen at the Naval Academy in 1915-1916 and first appeared in the *Current History Magazine* of the *New York Times*. In addition to a preliminary discussion of sea power and a general estimate of the situation, a chapter is devoted to each of the following naval actions: Heligoland Bight, Coronel, Falkland, Dardanelles, Dogger Bank and Jutland, with additional chapters on submarine and anti-submarine warfare and the naval lessons of the war. In the appendix there are articles on the comparative strength of navies, illustrated by excellent sketches and diagrams; the *Emden* exploits; and on America's part in the development of naval weapons and tactics. This book, which is in no sense propaganda, should meet the needs of the present popular interest in naval affairs, particularly in submarine warfare. It is used for instruction purposes at the U. S. Naval Academy in the naval history course in the department of English.

A. W. B.

"Small Arms Instructors' Manual, 1918." Compiled by the Small Arms Instruction Corps. 60 cents net. (New York: E. P. Dutton and Company.)

This is a manual of convenient size and moderate price that gives an excellent presentation of data required by every one whose duties in any way bear on the training of individuals and units in the use of small arms.

Inasmuch as it would be manifestly impossible to produce in one volume *all* the information and knowledge available on the use of the rifle and pistol, while at the same time it is highly desirable for instructors in this work to be equipped with a manual that contains the information essential to it, it is considered that this is a very valuable, not to say necessary, step to present in one volume the methods of training together with the data that is considered indispensable to an intelligent understanding not only of those methods, but of the use of small arms as they apply to both the soldier and the leader.

It is evident that those who prepared the work devoted considerable thought to their object, having in mind the needs of the instructor and also the limitations of the pupil, and the result is a book that presents clearly and

without excess verbiage the knowledge necessary for a competent instructor as well as for a good rifleman. The book should be in the hands of every one whose duties are in any way allied with the training of men in the use of small arms, either in the gallery, on the target range, or the battlefield.

A. D. R.

"The Flyer's Guide." By Captain N. J. Gill, Royal Artillery. $1.50 net. (New York: E. P. Dutton and Co.)

This book will be a valuable asset for the man who intends to become an aeroplane pilot. Captain Gill treats his subject in the most elementary manner, thereby making his book of especial interest to the beginner. The book is written from the beginner's viewpoint, and the facts brought out are those which generally puzzle the novice, and which are usually learned only after considerable practical experience. The subject is treated from a neutral standpoint in so far as any particular type of machine is concerned, and is equally interesting and instructive whether the prospective pilot intends to operate a biplane or a monoplane.

The author divides his subject into two main parts. The first deals in three chapters with the steps necessary to become a practical flyer and instructs in the art of taking care of an aeroplane. The first chapter deals with the steps necessary to obtain a pilot's license, the second with remarks on practical flying, and the third with the construction of aeroplanes. As said above these chapters are technical only in the smallest degree, but cite many valuable points necessary for the beginner to learn, which are generally only learned as the result of hard experience.

The second part covers, in three chapters, the elementary theory of flight, internal combustion engines, and ignition devices. No details are given of any particular engine or ignition device, but the description is such that the general theory of both is well covered. This part of the book shows the reader what it is necessary to study and thoroughly grasp before it is possible to become a practical aeroplane pilot.

This book is recommended to all who have the desire to become aeroplane pilots as it gives an excellent idea of what has to be studied and learned before becoming a successful practical flyer.

T. G. E.

"Army and Navy Uniforms and Insignia." How to know rank, corps, and service in the military and naval forces of the United States and foreign countries. With 8 illustrations in color and 117 in black and white. By Col. Dion Williams, U. S. Marine Corps. 294 pages. Price $1.50 net. (New York: Fred. A. Stokes Company, 1918.)

"Military and Naval Recognition Book." A handbook of the organization, insignia of rank, and customs of the world's important armies and navies. With 54 full-page plates, 18 in colors. By Lieutenant J. W. Bunkley, U. S. Navy. 218 pages. Pocket size. Price $1.00. (New York: Van Nostrand Company, December, 1917.)

Our entry into the war, with the sudden appearance of military and naval uniforms throughout the country, and the call to every village to sup-

ply its quota to one or another branch of the service, has naturally aroused a keen general interest in every aspect of military affairs. One phase of this interest, the layman's curiosity regarding the uniforms, insignia, and customs of our fighting forces, the books listed above are admirably designed to gratify. And in view of the intricacies of the subject and the space given to foreign armies and navies, they should also prove very useful to men both new and old within the service.

A brief comparison will suggest the scope of the two books and the main differences between them. Each gives about 68 pages to foreign uniforms. While Colonel Williams' book is considerably larger, the additional space is devoted chiefly to historical information and fuller descriptions. As regards the value of the latter, it may be said that in explaining rank and corps insignia, specialty marks, etc., the pictures are all-important; verbal descriptions are as difficult to visualize as a landscape in Scott's novels.

Colonel Williams gives 22 pages to the Marine Corps; Lieutenant Bunkley gives two. Similarly, the first writer gives much more space to the Coast Guard, Light House Service, and Coast and Geodetic Survey, and devotes 12 pages to the Health Service, which the second writer does not treat. On the other hand, there is nothing superfluous in the Recognition Book. Its style is concise, simple, and definite.

The complexity of the subject treated is indicated by the fact that slight errors appear in both volumes. Neither book mentions in the text the army second lieutenant's new half-inch gold shoulder bar and brown sleeve braid, though they appear in the plates. The anchor on a midshipman's collar is not "foul" (Bunkley, p. 110), and there seems no reason for spelling *sergeant* two ways on the same page (*Ibid.*, p. 92). A lieutenant commander is not identified by a "*silver* leaf" (Williams, p. 112); in fact, the emblem is properly described on p. 123. In view of the non-existence of a Belgian Navy, better subjects for illustration could perhaps be found than the flags of Belgian admirals and commodores (Williams, p. 56). When several cuts appear on the same page, the better practice would be to put the appropriate legend immediately under each, instead of together at the foot of the page, as in the author last mentioned. The difficulty is increased when, as on page 172, the legends appear on the wrong page.

These slips are mentioned as matters of detail, rather than as a reflection on the general excellence and accuracy of the two volumes, which represent most useful work well done.

A. F. W.

"The Fleets Behind the Fleet." By W. MacNeile Dixon, Professor in the University of Glasgow. 127 pages and two maps. Price 2s. 6d. (Hodder and Stoughton. Doran and Co., N. Y. agents.)

Here are 127 pages of fluent and readable rhetoric in praise of Britain's merchant seamen and fishermen in the war. It may pall a bit at times, for the admirable reticence of the average Britisher regarding his achievements is not always imitated by his chroniclers. The deeds which form the theme of the present volume are in truth beyond praise, and the tale of them needs little commentary. It is for this reason that the occasional facts and

concrete episodes the writer offers make us wish he had given more. Here are a few specimens:

"The gear of the trawler *Pelican* was just being hove in when a mine was discovered entangled in the warp. The winch was stopped just as the mine bumped—anxious moment—the ship's side. The skipper ordered all hands into the boat and to pull away. Remaining alone on board, with infinite care he worked to clear the mine, gently, very gently, unwinding the gear of the winch. The men lay on their oars at a safe distance and waited in suspense. At last the mine was released and the skipper paid out 120 fathoms of line. Hardly was it done when, having touched something, the devil-fish exploded, shaking the trawler from stem to stern and half filling the distant boat with water."

The *Strathearn*, with other trawlers, was attacked by a submarine. "While the shots were falling round, some of the crew shouted to Geordie, the skipper, 'Geordie, get the boat out.' Said Geordie, 'I'll see you in hell first! Fire up! If she's gaun doon, I'm gaun doon. Fire up! I think we hae a chance.' During this time Geordie was making toward another trawler, the *Commissioner* (armed), which had her gear down and seemed totally unconcerned. But as soon as the *Strathearn* passed her, and there was nothing between the submarine and herself, a blow with an axe cut her gear away, she swung round, and at the same moment, her gun appeared. . . . The fifth shot sent the submarine down in flames."

Here is the tribute of a destroyer commander, meeting a Channel trawler in a snow squall: "'They're It, absolutely It,' said the captain, 'No weather's too bad for 'em. They're our eyes and our ears. They know every blessed wave in the Channel, not merely as passing acquaintances, but they address 'em by their Christian names. They'll do anything, and go anywhere and chance the luck. They're just simple fishermen, but they run the whole show and they run it magnificently—guns, semaphores, wireless, everything! They live on kippers and tea, and I don't believe they ever go to sleep.'"

The book may be journalistic in treatment, but it is right in spirit. It brings home the fact that a nation's naval power must be calculated "in the broad terms of men and ships"—not her military navy alone, but her seafaring population and her merchant marine.

A. F. W.

"Finding and Stopping Waste in Modern Boiler Rooms." By Engineers of the Harrison Safety Boiler Works. Cloth, 9 inches by 7 inches; 276 pages; 213 illustrations; $1.00. Philadelphia, Pa.

The saving of coal is the purpose of this practical handbook, which is addressed to power plant owners, managers, engineers and firemen. The preface states that such statements, tables, charts, etc., have been selected as were supported by experiments and tests, references being given wherever possible to the original authorities. The latter include many well-known engineers and writers in technical periodicals, also authors of papers before engineering societies, while the excellent bulletins on the utilization

of fuel issued during recent years by the United States Bureau of Mines have been freely drawn upon. Pains have been taken to compare statements and to check each source of information against others.

The work is divided into five sections, the first of which is about "Fuels," under which are considered the coals of the United States and their classifications, size of coal, coal sampling, proximate analysis, ultimate analysis, heating value of coal, ash and clinker, value of coal for steaming purposes, purchase of coal under specification, washing of coal storage and weathering of coal, coal measurement, oil fuels and gaseous fuels.

The second section is on "Combustion," taking up the chemistry of combustion air theoretically required, grates and grate surface, hand firing methods, thickness of fire, mechanical stokers and their operation, furnace temperature, furnace gases, clinker, draft, flue and stack proportions, draft required by stokers, mechanical stokers, draft gages, dampers, flue gas temperatures, flue gas analyses, CO_2 recorders, what CO_2 indicates, what CO indicates, air requirements and supply, preventing excess air, smoke and smoke prevention, burning oil fuel, burning gaseous fuels, and burning powdered coal.

The third section treats of "Heat Absorption," including heat transmission by conduction, convection and radiation, heat transfer from a fluid in a channel, heat transfer in economizers, air heaters and superheaters, improving heat absorption, relation between heating surface and boiler capacity, boiler setting, refractories and fire brick, soot, scale, softening feed water, and feed water heating.

The fourth section on "Boiler Efficiency and Boiler Testing" covers heat balance, heat absorbed by boiler, heat losses due to moisture in the coal, hydrogen, chimney gases, CO, combustible in the ash, moisture in the air, and unaccounted for loss, efficiencies, efficiencies with different coals, boiler capacity and efficiency, and boiler trials.

The fifth section on "Boiler Plant Proportioning and Management," discusses various arrangements of auxiliaries with regard to their effect upon feed heating, and also describes the Polakov functional system of boiler room management.

The book has been compiled by George H. Gibson, member American Society Mechanical Engineers, assisted by Percy S. Lyon, now captain of Coast Artillery. The proofs were read by Mr. Henry Kreisinger, who conducted for the U. S. Bureau of Mines many of the investigations quoted in the text.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-fifth year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be two dollars and fifty cents, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly; subscription for non-members, $3.00; enlisted men, U. S. Navy, $2.50. Single copies, by purchase, 30 cents; issues preceding January, 1918, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1919

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best essay on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the essay.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All essays published in the PROCEEDINGS during 1918, which are deemed by the Board of Control to be of sufficient merit, will be passed upon by the Board during the month of January, 1919, and the award for the prize will be made by the Board of Control, voting by ballot.

2. No essay received after November 1 will be available for publication in 1918. Essays received subsequent to November 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best essay published during 1918 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute. the actual amounts of the awards to be decided by the Board of Control in each case.

5. Essays are limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

6. It is requested that all essays be submitted typewritten and in duplicate; essays submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

G. M. RAVENSCROFT,
Lieut. Commander, U. S. N., Secretary and Treasurer.

LIST OF PRIZE ESSAYS

"WHAT THE NAVY HAS BEEN THINKING ABOUT"

1879

Naval Education. Prize Essay, 1879. By Lieut. Commander A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut. Commander C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser Best Suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of Its Decline and the Means to Be Taken for Its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut. Commander F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How May the Sphere of Usefulness of Naval Officers Be Extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill Are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: Its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut. Commander W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for Our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: Their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U. S. S. Vesuvius, with Special Reference to Her Pneumatic Battery. Prize Essay, 1894. By Lieut. Commander Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut. Commander Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention, 1896. By Lieutenant John M. Ellicott, U. S. N.

1897

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut. Commander Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of Its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure Its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize Essay, 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear Admiral Stephen B. Luce, U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut. Commander A. P. Niblack, U. S. N.

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1907

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A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

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1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

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A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotton, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

1912

Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut. Commander T. D. Parker, U. S. N.

1913

The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut. Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A Study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut. Commander Dudley W. Knox, U. S. N.

1914

The Great Lesson from Nelson for To-day. Prize Essay, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. N.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. N.

1915

The Rôle of Doctrine in Naval Warfare. Prize Essay, 1915. By Lieut. Commander Dudley W. Knox, U. S. N.

AN AIR FLEET: OUR PRESSING NAVAL WANT. First Honorable Mention, 1915. By Lieut. Commander Thomas Drayton Parker, U. S. N.

TACTICS. Second Honorable Mention, 1915. By Ensign H. H. Frost, U. S. N.

DEFENCE AGAINST SURPRISE TORPEDO ATTACK. Third Honorable Mention, 1915. By Ensign R. T. Merrill, 2d, U. S. N.

1916

The Moral Factor in War. Prize Essay, 1916. By Lieutenant (J. G.) H. H. Frost, U. S. N.

NAVAL PERSONNEL. First Honorable Mention, 1916. By Lieut. Commander J. K. Taussig, U. S. N.

EDUCATION AT THE U. S. NAVAL ACADEMY. Second Honorable Mention, 1916. By Lieutenant Ridgely Hunt, U. S. N.

SOME UNDERLYING PRINCIPLES OF MORALE. Third Honorable Mention, 1916. By Commander Dudley W. Knox, U. S. N.

LARGE *vs.* A GREATER NUMBER OF SMALLER BATTLESHIPS. Lippincott Prize Essay. By Lieut. Commander Thomas Lee Johnson, U. S. N.

1917

Commerce Destroying in War. Prize Essay, 1917. By Commander Lyman A. Cotten, U. S. Navy.

THE PEOPLE'S RÔLE IN WAR. First Honorable Mention, 1917. By Lieutenant H. H. Frost, U. S. Navy.

THE NATION'S GREATEST NEED. Second Honorable Mention, 1917. By Colonel Dion Williams, U. S. Marine Corps.

1918

Letters on Naval Tactics. Prize Essay, 1918. By Lieutenant H. H. Frost, U. S. N.

THE PREPAREDNESS OF THE FUTURE. First Honorable mention, 1918. By Commander H. O. Rittenhouse, U. S. N. Retired.

NAVAL STRATEGY. Second Honorable Mention, 1918. By Rear Admiral Bradley A. Fiske, U. S. N.

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More members, both regular and associate, are much desired. Any increase in membership invariably means larger number of papers and essays submitted, and consequently an improvement in the PROCEEDINGS.

You are requested to send or give the attached slip to some one eligible for membership, urging him to join.

By direction of the Board of Control,

G. M. RAVENSCROFT,
Secretary-Treasurer.

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.....*191*

To the Secretary and Treasurer,
U. S. Naval Institute,
Annapolis, Md.

Dear Sir:

Please enroll my name as a { *regular* / *associate* } *member of the U. S. Naval Institute from this date.*

Very truly yours,

.....

.....

VOL. 44 APRIL 1918 No. 182

United States Naval Institute Proceedings

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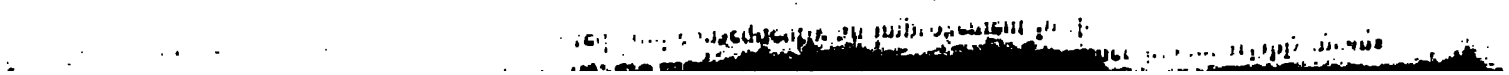

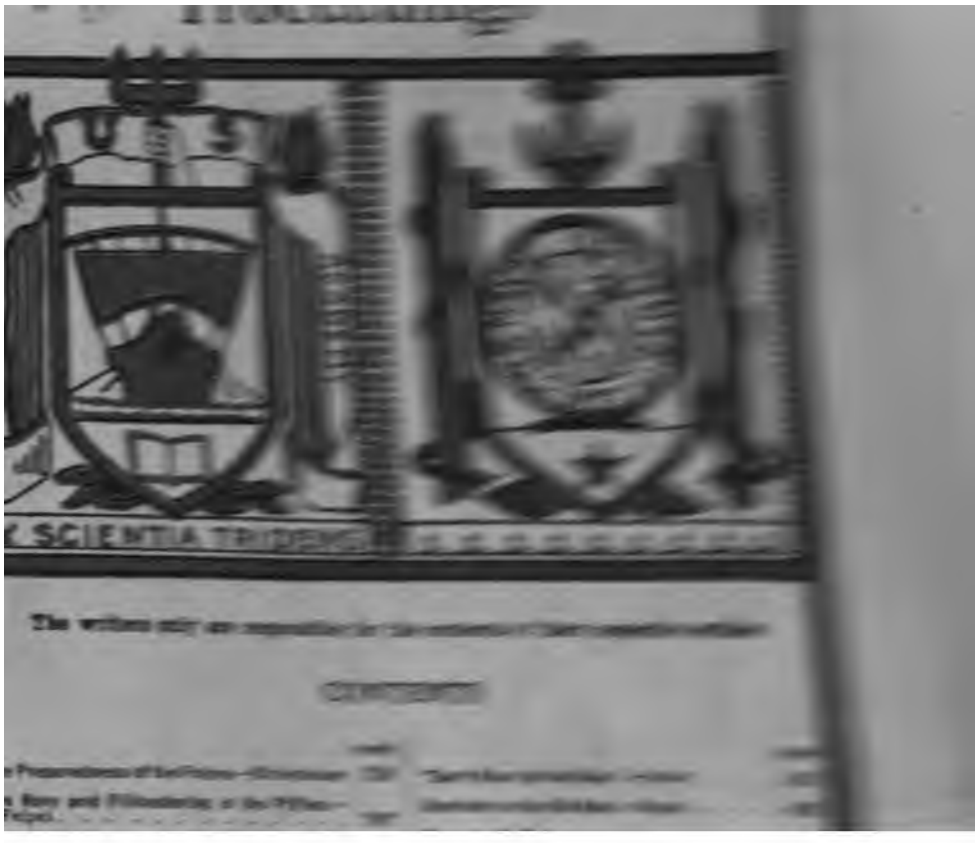

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1873-1918

PUBLISHED MONTHLY

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ANNAPOLIS, MARYLAND

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This book was prepared in order to provide an up-to-date text-book for the midshipmen at the U. S. Naval Academy. Plates and descriptions include the most modern boiler installations on naval vessels. The great gain in fuel economy made possible by the combination of gas analysis with intelligent firing is fully described. The causes of boiler corrosion with the practical methods of its prevention are included. A study of the book should furnish all the information necessary for the efficient handling of a boiler plant. This book has been revised to May, 1915.

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U. S. NAVAL INSTITUTE
ANNAPOLIS — MARYLAND

"SANTA BARBARA."

PATRONESS OF THE NAVAL BUREAU OF ORDNANCE.

This print was presented by Commander W. M. Folger, U. S. N., Chief of Bureau of Ordnance, 1890.

UNITED STATES NAVAL INSTITUTE
PROCEEDINGS

Vol. 44, No. 6 **JUNE, 1918** **Whole No. 184**

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SANTA BARBARA
THE PATRONESS OF THE NAVAL BUREAU OF ORDNANCE

By REAR ADMIRAL RALPH EARLE, U. S. Navy

In the office of the chief of naval ordnance, at Washington, D. C., there hangs a handsome portrait of Santa Barbara, the patron saint of ordnance, which was presented to the bureau by Rear Admiral William M. Folger, U. S. N., chief of the bureau from February, 1890, to January, 1893.

Many inquiries as to why the picture is displayed so prominently and as to what it means are made by visitors, both officers and civilians. The search for the real legend was not as simple as had been thought. Believing, therefore, that the result of such an inquiry may be of interest to the service, the bureau asked Mr. Alan S. Hawkesworth, F. R. S. A., to write the story of the beautiful Saint Barbara. Her tragic and short life is set forth by him as follows:

In the Roman, the Greek, and the Russian calendars, the feast-day of "Saint Barbara, Virgin and Martyr," is celebrated on December 4, the presumed anniversary of her martyrdom. The details of her legendary life and death, which are acknowledged to be mythical, are given by the Bellandists, and other authorities.

She is said to have lived at the close of the third and beginning of the fourth century, and to have paid for her faith by her life during the great Diocletian persecution, in 306 A. D., although the

In art she is pictured standing by her three-windowed tower and holding in her hands the palm of her martyrdom, or sometimes a chalice and sacramental wafer, while cannon are displayed at her feet.

Descriptions of her cult, in modern times, were written by Celestin, "Histoire de S. Barbe" (Paris, 1853); Villemot, Histoire de S. Barbe, Vierge et Martyre" (Paris, 1865); and Peine, "St. Barbara die Schutz Heilige der Bergleute und der Artillerie, und ihre Darstellung in der Kunst" (Freiberg, 1896).

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THE NAVY AND FILIBUSTERING IN THE FIFTIES

(CONTINUED)

By LOUIS N. FEIPEL

III. THE BOMBARDMENT OF GREYTOWN, NICARAGUA, 1854

In 1855, the scene of American filibustering shifted to Central America, and in particular to the republic of Nicaragua. Events had been leading up to this ever since the year 1848. A few days after the conclusion of the treaty of Guadalupe Hidalgo, by which the United States became the rightful owners of California, and thus invested with augmented special interest in the political condition of Central America, the American Government learned that a military expedition, under the authority of the British Government, had landed at Greytown (or San Juan del Norte, as it was then called), in the state of Nicaragua, and taken forcible possession of that port, which was the necessary terminus of any canal or railway to be constructed across the isthmus within the territories of Nicaragua. It did not diminish the unwelcomeness to us of this act on the part of Great Britain to find that she assumed to justify it on the ground of an alleged protectorship of a small and obscure band of uncivilized Indians, whose proper name even had become lost to history, who did not constitute a state capable of territorial sovereignty, either in fact or of right, and all political interest in whom, and in the territory they occupied, Great Britain had previously renounced by successive treaties with Spain, when Spain was sovereign of the country, and subsequently with independent Spanish America.

Nevertheless, and injuriously affected as the United States conceived itself to be by this act of the British Government, and by its occupation about the same time of insular and of continental portions of the territory of Honduras, ed the many

and powerful ties and mutual interests by which Great Britain and the United States were associated, and we proceeded in earnest good faith, and with a sincere desire to do whatever might strengthen the bonds of peace between us, to negotiate with Great Britain a convention to assure the perfect neutrality of all inter-oceanic communications across the isthmus, and, as the indispensable condition of such neutrality, the absolute independence of the states of Central America and their complete sovereignty within the limits of their own territory, as well against Great Britain as against the United States. That object was supposed to have been accomplished by the convention of April 19, 1850 (the Clayton-Bulwer treaty), which would never have been signed or ratified on the part of the United States but for the conviction that, in virtue of its provisions, neither Great Britain nor the United States was thereafter to exercise any territorial sovereignty, in fact or in name, in any part of Central America, however or whensoever acquired, either before or afterwards. The essential object of the convention—the neutralization of the isthmus—would, of course, become a nullity if either Great Britain or the United States were to continue to hold exclusively islands or mainland of the isthmus, and more especially if, under any claim of protectorship of Indians, either government were to remain forever sovereign in fact of the Atlantic shores of the three states of Costa Rica, Nicaragua, and Honduras.

But in August, 1851, more than a year after the Clayton-Bulwer treaty had been perfected, a British vessel-of-war appeared in the fine and commanding harbor of Ruatan, an island belonging to the republic of Honduras. The captain of this vessel, an officer named Jolley, then proceeded to organize the island as a dependency of Belize (sometimes called British Honduras); and in July, 1852, a proclamation was made from Belize as follows:

OFFICE OF THE COLONIAL SECRETARY,
BELIZE, JULY 17, 1852.

This is to give notice that Her most Gracious Majesty our Queen has been pleased to constitute and make the islands of Ruatan, Bonacca, Utila, Barbarat, Helene, and Morat, to be a colony, to be known and designated as "The Colony of the Bay Islands."

By command of Her Majesty's Superintendent,
AUGUSTUS FRED. GORE, *Colonial Secretary*.

God save the Queen!

The British continued to hold possession of the Ruatan Islands up to 1856, and by the occasional presence of an English man-of-war at Greytown, continued their old pretensions to the Mosquito Coast. The threatened abrogation of the Clayton-Bulwer treaty restored matters to their old footing, except that the course of manifest destiny, during the intervening five years of drivelling diplomacy, ordained the occupation of the country by another race, in whom Great Britain found more energetic sticklers for the rights of their adopted soil than the dreamy and enfeebled creatures who for the preceding three centuries had claimed it as a home.

In March, 1852, Greytown was constituted a " free city," subject to the paramount authority of any power which might be decided to hold the government of the country to which Greytown belonged. All of its municipal regulations, port charges, and customs duties were determined by a mayor and council, who were, however, mere creatures of the British consul, the latter being virtually a dictator. The authorities of Greytown were formally acknowledged by the government of Great Britain, and Vice Admiral Sir George Seymour withdrew his ships from that station, as being no longer needed, thereby virtually confirming in the hands of, and ackowledging the ability of, the new government to maintain its laws. The people of Greytown looked with confidence for a similar recognition on the part of the United States.

At the time of which we are speaking, citizens of the United States had already established in the territory of Nicaragua a regular interoceanic transit route (the Accessory Transit Company), second in utility and value only to the one previously established in the territory of New Granada. By the year 1853, the Nicaragua route was doing a good business between New York and San Francisco. The trip between the two places was sometimes made in 19 days, which was shorter than by way of Panama. The steamer from New York went to Greytown, and there the passengers were put on board light-draft stern-wheel steamboats, which went up the San Juan River to Lake Nicaragua. There, at a village called Fort San Carlos, the passengers were transferred to commodious side-wheel steamboats, in which they crossed the lake to Virgin Bay, and from Virgin Bay they crossed in a conveyance of some kind to San Juan del Sur, a

distance of 10 miles, and then went on board the ocean steamer for San Francisco.

The condition of Nicaragua would doubtless have been much more prosperous at this time, but for the occupation of Greytown by Great Britain and the disturbing authority set up and sustained by that power in the Mosquito Coast, by means of which the domestic sovereignty of Nicaragua became impaired, its public lands withheld from settlement, and itself deprived of all the maritime revenue which it would otherwise have collected on important merchandise at Greytown. The United States Government had never recognized the sovereignty of a King of Mosquito, or the protectorate of Great Britain over Greytown. Daniel Webster, as Secretary of State, had, however, declared, in a letter to Commodore Foxhall A. Parker, dated March 13, 1852, that "a temporary recognition of the existing authority of the place (San Juan de Nicaragua, or Greytown), sufficient to countenance any well-intended endeavors on its part to preserve the public peace and punish wrong-doers, would not be inconsistent with the policy and honor of the United States"; and he accordingly directed the commodore, in the name of the President of the United States, "to repair to Greytown, and, in conjunction with Her Britannic Majesty's admiral on the West India Station, to see that all reasonable municipal and other regulations in force there were respected by the vessels and citizens of the United States resorting thither." Webster, also, learning that in an assemblage of persons styling themselves citizens of Greytown, held there on the 28th of February, 1852, resolutions had been passed to send a deputation to the capital of the republic of Nicaragua for the purpose of soliciting a charter for their city, requested, on the 18th of March following, Secretary of the Navy Graham to give to the American citizens, believed to have formed a majority of said assemblage, timely warning "that they would not be countenanced by his government in any attempt, forcibly or otherwise, to subvert the acting authorities." Subsequently, after the election of new municipal authorities at Greytown, in conformity with the constitution of March 29, 1852, and after the conclusion of the new treaty between the United States and Great Britain signed on the 30th of April of the same year, Lord Clarendon stated, in a despatch to the British minister at Washington, dated July 22, 1853, that both the British and American governments

had ordered their naval commanders to support the government *de facto* of Greytown; and Secretary of State Marcy, in a despatch to Mr. Ingersoll, the American minister at London, dated June 9, 1853, referring to said joint order, says that its purpose was to preserve the public peace at Greytown, and to punish wrong-doers.

The harbor of Greytown was formed by an island at the mouth of the San Juan River, and lying opposite to the town. On this island (called Punta Arenas) the Transit Company had its store-houses, and as long as the California passengers were detained occasionally and sent ashore to the town to pass a night or two, everything went smoothly. Finally, however, the company decided to build a hotel on the island, to keep the passengers on its side of the river during the transit, and to prevent their landing at Greytown at all—in short, to do all the "skinning" itself. This was more than the Greytowners could stand, and they accordingly declared war to the knife.[1]

On February 3, 1853, the "council" of Greytown passed a resolution ordering the Accessory Transit Company to remove within five days the buildings which it had just completed on Punta Arenas, and also to vacate the entire tract within 30 days. The company naturally ignored the demand; and the agent of the company, agreeable to instructions received from his principals in New York, proceeded to call on the British warship *Geyser* for protection. Captain Wilson, of the *Geyser,* however, informed the agent that he could render him no assistance. Getting wind of this state of affairs, the American sloop-of-war *Cyane,* Commander George N. Hollins, repaired to Greytown in order to keep the peace. The *Cyane* arrived on the 10th of February, and the agent of the company at once appealed to Commander Hollins for protection.

A portion of the property had already been destroyed, and the authorities of Greytown were proceeding to destroy the rest, when Hollins decided to dispatch his first lieutenant, Theodore P. Green, to the mayor of Greytown, with orders to state that information had been lodged with the American commander that on the succeeding day (February 11) a writ of ejectment would be served by the Greytown authorities upon the Transit Company, and in

[1] Parker, "Recollections of a Naval Officer," 165.

case of the company's refusal to remove the property, force would be used to compel them. Lieutenant Green found the council assembled, the mayor presiding, made the statement, and requested their answer. He was told to inform Commander Hollins that the process was a legal one, and that they would carry it into effect on the succeeding day, at 11 o'clock in the morning, unless prevented by a stronger force.

On the morning of the 11th, at 9 o'clock, Hollins went ashore to pay his respects to the mayor, and was received in the council chamber, the council being assembled. Hollins again informed them that in obedience to his orders he was compelled to put a stop to any depredations upon the property of the Transit Company. The mayor replied that "no depredations would be committed, they only intended to pull the building down." The mayor then requested a statement in writing of Hollins' intentions to prevent the execution of the process, which Hollins acceded to, and then withdrew to the ship.

Purser Charles C. Upham and Acting Lieutenant William H. Parker, of the *Cyane,* shortly afterwards returned from a visit to the town, bringing information that the troops were under arms and preparations making to proceed against Punta Arenas and its occupants, and that threats were being made to destroy the property by fire. Orders were accordingly given to land a marine guard on the Point, under the command of Lieutenant William Decatur Hurst, with instructions to inform the marshal that the property could not be molested, to warn off all suspected persons, and to prevent the execution of the threats. The marshal, upon being asked his business by Lieutenant Hurst, replied, "to tear down the buildings." Lieutenant Hurst then informed the marshal of his orders to protect the property of the company, and that he intended to obey and carry them out, whereupon the marshal immediately mustered his "posse of carpenters" and returned to Greytown.

From the many threats and the manifest excitement among the inhabitants of Greytown, Hollins deemed it necessary to continue the guard on Punta Arenas, about the property of the Transit Company, particularly at night. He also thought it proper to warn the citizens of Greytown of his intentions as to the persons and property of citizens of the United States who might be molested. One such instance had indeed already occurred. An American physician, named H. W. Wagner, was assaulted, on

March 14, in the most gross and indecent manner by three persons belonging to the militia of the town, who alleged, as an excuse, that Wagner had made false statements about the authorities having destroyed property belonging to another American citizen. Accordingly Hollins issued the following notice:

> Inasmuch as no competent authority is in existence in the town of San Juan de Nicaragua to protect the property or persons of American or other citizens, and information having been lodged with me that an assault was committed upon the person of an American citizen by some person or persons in said town, I hereby warn all persons in said town that in case of any further molestation of any citizen or property, I shall take such steps as to bring the offender to punishment.
>
> And further, that all boats to and from Point Arenas and San Juan de Nicaragua will pass within hail of the ship under my command.[2]

Hollins was soundly abused by the Greytowners for this, but he bore it philosophically, especially as the proclamation was heeded.[3]

Shortly afterwards, the *Geyser* again arrived off Greytown, under orders from Commodore McQuhae, who, it seems, had received a dispatch from the mayor of Greytown, informing him that Hollins had landed the marines of the *Cyane,* hauled down the Mosquito flag, taken charge of the town, and blockaded the harbor. Under this false impression the commodore had sent the commander of the *Geyser* to inquire into the facts of the case. It was plain that Commodore McQuhae had assumed to himself the right to district the limits of the city of Greytown. He included Punta Arenas within the jurisdiction of the city of Greytown, thus giving that city the right to execute any decree of their court, no matter how unjust to either persons or property. Hollins was fully convinced, from all that he saw and heard, that the whole cause of the hostility of Greytown towards the Transit Company proceeded from the company's refusing to move their depot and steamers to the city of Greytown, which would have been detrimental to their best interests.

In his official report to the Navy Department, Hollins justified his actions in the following terms:

> On my arrival here, not having any authority by which I could be guided, I obeyed strictly the orders from the Navy Department to protect the property of the Accessory Transit Company, and also took for my guide the instructions of the late honorable Daniel Webster, which prescribes no

[2] Senate Exec. Doc. No. 8, 33d Cong., 1st Sess.

[3] Parker, "Recollections of a Naval Officer," 165.

special limits to this town, nor recognizes any jurisdiction of its court other than for its own police purposes, but at the same time gives to commanders of both American and English vessels of war full power to correct abuses and settle all difficulties.[4]

The Navy Department approved the prompt and prudent action of Hollins, and under date of April 4, 1853, instructed him to remain in the vicinity of Greytown as long as his presence might be deemed necessary to protect the property and persons of American citizens. The Secretary of the Navy added:

It is, of course, very important, in order to avoid collision, that your course should be marked with caution; but, at the same time, the impression should be distinctly made that the United States are both able and determined to protect the property and rights of American citizens. Of course, you will confine yourself to that one duty, carefully avoiding any act committing your government in any of the contested questions of jurisdiction at present disturbing that country.[5]

In giving its approval to Hollins' conduct, the Secretary of the Navy deemed it proper, also, to state to him the real grounds on which that approval was based.

Your conduct in affording protection, and saving from destruction the property of that company, is commended not because of any supposed stipulation for that purpose by convention between Great Britain and the United States, but because American citizens are largely and chiefly interested in said company, the charter of which was granted and guaranteed by the State of Nicaragua, within the limits of which state the town of San Juan is situated, and which charter was granted even long before any attempt was made to convert Greytown into what is now alleged to be an independent city. The authorities of Greytown have no right to interfere with rights and privileges thus granted by the State of Nicaragua. When they therefore attempted to destroy the property of the company, your interference is justified and approved solely because it is regarded as an unauthorized attempt to disturb the rights of American citizens, and the United States desire that the American citizen "shall realize that, upon every sea and on every soil where our enterprise may rightfully seek the protection of our flag, American citizenship is an inviolable panoply for the security of American rights."[6]

Meanwhile, however, on February 13, 1853, Commander Hollins received a visit from the British vice consul, Henry Grant Foot, who had just returned from Bluefields. He brought with him dispatches from Vice Admiral Seymour and Commodore McQuhae, of Her Britannic Majesty's naval forces in the West Indies, directed to Commodore Parker, with directions to place

[4] *Ibid.* [5] *Ibid.* [6] *Ibid.*

them in the hands of the senior American officer in command, in case Commodore Parker should be absent. These dispatches had reference to the concerting and concluding of such arrangements between Commodore Parker and Commodore McQuhae as should appear to both, conjointly, best suited to carry out the views of the British and American governments for the recognition of the *de facto* governing authorities of the port of Greytown, until some permanent arrangement should be concluded for the general and final settlement of the Mosquito and Central American question then pending between Great Britain, the United States, and certain of the Central American States.[7]

By the 16th of April, all was quiet again around Greytown. Hollins, however, soon heard rumors that the authorities of Greytown threatened the destruction of the Transit Company's property as soon as ever he left the harbor. Under these circumstances he did not deem it advisable to leave the place before being relieved, or before some positive arrangements could be made with the authorities, by which the property of the company would be respected. The English commanders in that region also received orders from their minister at Washington not to permit the property of the company to be molested, but at the same time their orders from the commodore of the station were for them not to remain in port over 48 hours, on account of preserving the health of their crews. The *Cyane* remained at Greytown for 70 days, "The dreariest time," as one of her officers subsequently wrote, "I ever passed in any foreign port, and that is saying a great deal. Our only excitement was caused by the arrival of the steamers from New York and New Orleans, which made fortnightly trips and brought us our mails, and the arrival of the steamers from Lake Nicaragua with the San Francisco passengers."[8]

On May 30, 1853, the sloop-of-war *Albany,* Commander James T. Gerry, arrived at Greytown. The authorities of the place, as well as the agents of the Transit Company, immediately called on Commander Gerry, who soon perceived from their accounts that a mediator was required to bring the two parties to a mutual

[7] *Ibid.*

[8] Parker, "Recollections of a Naval Officer," 165. The documents bearing upon these transactions between Hollins and the authorities of Greytown were called for by the Senate on the 6th of April, 1853, and printed as Senate Executive Document No. 8, of the 33d Congress, 1st Session.

friendly intercourse and a better understanding of each other's rights and views of subjects in dispute. Commander Gerry expressed his readiness to intercede and bring about a better feeling, provided each party should state to him all its grievances, and provided they consented to be influenced by his advice and opinion. The sequel showed that both parties had acted under strongly excited feelings, and that the one was quite as much at fault as the other. But in Commander Gerry's opinion, the inhabitants of Greytown were certainly entitled to more consideration than the Transit Company had extended to them, inasmuch as many of them had, at the company's invitation and through inducements held out to them, made large investments for accommodating the passengers of the company when the latter was unable to do so and depended solely upon the conveniences to be found in Greytown. The results of Gerry's investigations were attended with the most favorable consequences. On the 5th of June, he sailed from Greytown, leaving all parties apparently friends and determined to settle every point of controversy between them in future by arbitration, and not by violence.

Shortly after the arrival of Gerry at Greytown, also, the mayor informed him that if he wanted a marine who had deserted from the *Cyane* to be apprehended, he (the mayor) would order him in custody of an officer on board the *Albany* the following morning, which was promptly complied with as set forth.*

About a year later, events again occurred by reason of which the government of the United States considered itself justified in treating Greytown as a hostile city. In March, 1854, new differences arose between the people of Greytown and the Transit Company over the question of jurisdiction in Punta Arenas. Mr. Joseph L. White, agent of the company, left the place on the 17th of March, without having effected any settlement of the difficulties. Before leaving, he gave instructions to the captains and pursers of the steamships to pay no more port charges at Greytown, and to take no letters or other packages or freight for, and have no communication of any nature whatever with, the people of the town. This proceeding on the part of the company greatly exasperated the townspeople. Also, during the month of May, certain effects belonging to the company were feloniously taken

* House Exec. Doc. No. 86, 33d Cong., 1st Sess., p. 230.

away by a servant of the company and conveyed to Greytown, where they were withheld from the company by the corporate authorities. And at the same time, and in connection with this occurrence, two of the employees of the company were arrested on warrants emanating from the town authorities, charged with having resisted a legal process and committing an assault, and were placed under bonds to keep the peace towards the authorities and citizens of Greytown.

Moreover, about the middle of May, the United States minister to Central America, Mr. Solon Borland, was about to leave Nicaragua, and took passage on board the *Routh,* one of the San Juan River steamers. Nothing particular occurred during the passage down the river, until the steamer was within a few miles of Greytown. There Captain T. T. Smith, who was in command of the *Routh,* in turning a bend of the river, ran against a bungo freighted with merchandise which was lying near the shore, and damaged her by the collision. The master of the bungo began to abuse Captain Smith in Spanish, to which the latter retorted fully in English. While the steamer was being extricated from the brushwood, Captain Smith went and got his rifle from the cabin, vociferating repeatedly, "I must shoot the fellow; he has used threatening language that shall cost him his life." Shortly afterwards the master of the bungo was shot down by Captain Smith from the upper deck of the steamer, and the latter then proceeded on her way down the river.

Mr. Borland had witnessed, if not the beginning, at least the greater part of this shooting, from the upper deck, but apparently made no interference. Another passenger, however, a Mr. H. Wiedemann, tried to persuade Captain Smith not to carry out his design. Wiedemann even went so far as twice to prevent Smith from firing. The third time, Smith exclaimed, "I am captain of this boat, and I will not permit even my best friend to interfere." After having committed the deed, he made the following remark to Wiedemann: "I am sorry for this, but I could not help it."

On the evening of the 16th, the *Routh* arrived at Punta Arenas and went alongside the steamer *Northern Light* to disembark her passengers. About dusk, while the passengers were going from one steamer to the other, a bungo, having on board some 25 or 30 armed men, mostly Jamaica negroes, headed by a mulatto man calling himself the "marshal," came over from Greytown

and ranged up alongside the *Routh*. The so-called marshal, accompanied by several of his armed men, jumped on board the steamer, and announced his purpose of arresting Captain Smith, by virtue of a warrant from the mayor of Greytown, on the charge of murder. Captain Smith, however, refused to be arrested and armed himself for resistance.

At this stage of the proceedings, Minister Borland, who was at the time on board the *Northern Light*, was informed of what was going on. He immediately went on board the *Routh*, where he found a crowd of persons, among them a number of the armed men from the bungo, in a high state of excitement. The marshal, with his men, was attempting to arrest Captain Smith; and the latter, standing at the cabin door, was keeping them at bay. Mr. Borland at once interposed, telling the marshal that no authority recognized by the United States existed at Greytown to arrest or in any way to interfere with an American citizen, and ordered him to withdraw his men from the steamer and go away. The marshal proposed to exhibit the mayor's warrant under which he was acting, but this Mr. Borland declined to examine.

After some hesitation, the marshal announced his purpose of withdrawing, as advised by Mr. Borland. But while this was going on, and before the marshal and his men had left the steamer, much excitement was manifested among the men who had remained on board the bungo. Loud, threatening language was used by them, and, brandishing their weapons, several at once rushed on board the steamer. At this moment, Mr. Borland, taking a rifle from the hands of a bystander, stepped over the railing upon the guards, and warned the men in the bungo to keep off, and at their peril not to put a foot on the steamer. Upon this, the movement towards boarding the steamer ceased, and in a few minutes the marshal and his men returned to the bungo, and she returned to Greytown.

About dark, Mr. Borland, accompanied by Mr. Scott, a son of the agent of the Transit Company, boarded one of the boats of the *Northern Light* and went across the harbor to Greytown, in order to visit Mr. Fabens, our commercial agent. Soon after arriving there, Mr. Borland heard that at a meeting of the people of the town, held at the station-house, and presided over by the mayor, it had been proposed, and seemingly agreed to, that he (Mr. Borland) should be arrested. In a few minutes the exec

tion of this act was attempted. A loud knocking was heard at the lower doors of Mr. Fabens' house, and upon his going to ascertain the cause, a body of men, armed with muskets, consisting in part of the regular police of the town, and headed by a Jamaica negro, inquired for Mr. Borland, and declared their purpose of arresting him.

Mr. Borland, hearing this, went down-stairs, and demanded their business with him. The leader informed him that they had come by order of the mayor to arrest him because he had prevented the arrest of Captain Smith. Mr. Borland then repeated to them what he had said to the marshal about their want of authority, and inquired of them if they were not aware of his exemption from arrest in his capacity of minister of the United States. To this they replied that they cared nothing for all that, but that they had come to arrest him, and meant to do it. He then warned them of the serious consequences to themselves and to all concerned with them, if they proceeded to the extremities they proposed. They replied that they knew the consequences and were prepared to meet them. Mr. Borland then declared that they must proceed at their peril, and called several gentlemen, who were in an upper room, to come down and be witness of the threatened assault upon him. Thereupon the leader of the armed force called a Mr. Martin, who was ex-mayor, as if for the purpose of consultation, and Martin not answering, they went off a little from the door, in the direction where, from their manner, they expected to find him.

About this time, Mr. Borland still standing at the door, the mayor (a Frenchman) came up and said that these proceedings had been without his order and authority. To his proposition whether the minister would be satisfied with an address signed by all the respectable inhabitants of the place, expressing their indignation at the insult, Mr. Borland replied: "It is not I who have been insulted, but the government of the United States in my person." This naturally cut off all further endeavors on the part of the inhabitants to redress the matter. While this conversation was going on, some one from the crowd threw a broken bottle which struck Mr. Borland and slightly wounded him in the face. The particular person who threw the missile was not recognized, as the night was dark and there was a crowd on the porch about the door. Soon after this, the crowd dispersed.

Mr. Fabens, the commercial agent, then procured a canoe and crossed the harbor to the *Northern Light,* to make known the state of affairs on the other side. A meeting was held, at which it was agreed to send a committee of three gentlemen to consult with Mr. Boland as to the best steps to be taken. These gentlemen, with Mr. Fabens, proceeded in one of the steamer's boats to the town; but upon approaching the shore, they were hailed by a number of armed men, who fired one gun over the boat, and threatened to fire into them it they attempted to land, and this although informed that Mr. Fabens was on board and desired to go to his consulate. Thus forcibly prevented from landing, the boat returned to the *Northern Light.* During the night, Greytown was occupied by armed men, whose sentinels were stationed between the American consulate (where Mr. Borland still was) and the harbor, challenging all who attempted to pass, preventing boats from landing or leaving, and thus keeping Mr. Borland a prisoner all night.

The next morning, Mr. Borland procured a boat and returned on board the *Northern Light,* where he was informed by Mr. Fabens of the violent and lawless disposition manifested by the people of Greytown. The persons and property of our citizens were not deemed safe from aggression, or from destruction, in the absence of force sufficient to protect them. A meeting of the passengers was accordingly held, at which Mr. Borland proposed to engage the services of 50 men to remain and afford the necessary protection, until our government, informed of the state of affairs, should send a proper force for the purpose. The requisite number of men volunteered, and were organized under the command of Crawford Fletcher. Mr. Fabens took up his abode under their protection, while Mr. Borland embarked in the *Northern Light* to proceed forthwith to Washington and lay the matter before the government.

The *Northern Light* sailed on the evening of the 17th. The next morning the British war-steamer *Argus* arrived. The people of Greytown at once applied to her commander for an order to disperse the force of Americans at Punta Arenas, which he declined giving. The *Argus* remained four days in port, and sailed for Port Royal, Jamaica. On the morning of the arrival of the *Argus,* all the authorities of Greytown resigned their offices. The station-house, with the arms and ammunition belonging to

the town, continued in the possession of the Jamaica negroes, the same who had committed the outrage related above.

With respect to the existing controversy between the authorities of Greytown and the Transit Company, it was alleged by the residents of Greytown that the agents of the company wished to overthrow the authorities for two reasons: first, to relieve the company from port charges; and, secondly, to secure to certain employees of the company possession and title to lands within the jurisdiction of Greytown, acquired under an imperfect title. In order to carry out their object, it was alleged that the President of the United States was informed that it was due to the protection of American property there located, and in transit across the territory occupied by them, that Greytown should be destroyed and the inhabitants thereof dispersed. Accordingly, the President sent the sloop-of-war *Cyane* to the harbor of Greytown, with instructions to demand that immediate indemnity in a large amount should be made to the Transit Company, with prompt apology for the insult offered the United States minister, and satisfactory assurance for the future good behavior of the community.[10]

On June 10, the *Cyane,* which was then in New York, was ordered to proceed to Greytown. The orders to Commander Hollins included the following admonition:

> It is very desirable that these people should be taught that the United States will not tolerate these outrages, and that they have the power and the determination to check them. It is, however, very much to be hoped that you can effect the purposes of your visit without a resort to violence and destruction of property and loss of life. The presence of your vessel will, no doubt, work much good. The department reposes much in your prudence and good sense.

Meanwhile, on June 24, our consul, Mr. Fabens, notified the late "acting authorities and the people of the town" that the United States Government would require of them reparation for the wrongs they had committed against our citizens. He received no official reply, the town being, as has been said, without political organization. But the information which reached Fabens through private sources was to the effect that the people of the town were fully determined to make no pecuniary redress, either to the Transit Company or to the government of the United States, for

[10] House Rept. No. 281, 36th Cong., 1st Sess.

any obnoxious acts they might have committed. In the matter of the personal assault upon Mr. Borland, they were especially insulting in their remarks, and regretted, to use their own language, that they had not kept him a prisoner at Greytown and made him answerable for the act alleged to have been committed by Captain Smith.

The *Cyane* arrived at Greytown on July 11. After conferring on the situation, it was decided by Mr. Fabens and Commander Hollins that it would be expedient to renew the demand already made for reparation, and in such a manner as to impress the people of the town with the idea that satisfaction for their past injuries and insults towards American citizens must and would be had. Thereupon Fabens proceeded at once to Punta Arenas, to agree with Mr. Scott, agent of the Transit Company, as to the sum of money proper to be demanded for the losses and damages suffered by the company. Mr. Scott placed the sum at six thousand dollars. This amount being fully approved by Commander Hollins, on the same evening the demand was made, as follows:

COMMERCIAL AGENCY, UNITED STATES OF AMERICA,
SAN JUAN DEL NORTE, NICARAGUA, July 11, 1854.

To those now or lately pretending to and exercising authority in, and to the people of, San Juan del Norte:

GENTLEMEN: On the 24th ultimo, in accordance with the instructions of the government of the United States of America, I notified you that the said government would require of you immediate reparation for the property belonging to the Accessory Transit Company, which was stolen from the said company and received by you, as specified in my letter of that date, as well as for all damages suffered by their agents and employés while endeavoring to repossess themselves of the same. I have now, acting in concert with Commander Hollins, of the United States ship *Cyane*, at present in this harbor, to demand of you immediate payment of the sum of sixteen thousand dollars, which has been adjudged to be the proper sum for you to pay for the said property and the gross outrages perpetrated by you upon the persons of American citizens, as set forth in protests of Mr. Scott of the 12th May last, copies of which have already been served upon you.

There is likewise a claim of the Accessory Transit Company versus the acting authorities of San Juan del Norte for the sum of eight thousand dollars, as specified in my letter to you of the 24th ultimo. This you will be likewise expected to pay forthwith.

For the indignity offered to the United States of America in the conduct of the authorities and people of this town towards their minister, Mr. Bor-

land, while recently in this place, nothing short of an apology, promptly made, and satisfactory assurances given to Commander Hollins of future good behavior on the part of said authorities and people towards the United States and her public functionaries, who may in future be here, will save the place from the infliction which its late acts justly merit.

Your obedient servant,

JOSEPH W. FABENS,

United States Commercial Agent.

To this demand, the same reply, substantially, was given as to the previous one, only it was couched in more insolent language. But the presence in the harbor, at the time, of the British war-schooner *Bermuda* may have had some influence on the conduct of the people of Greytown on this occasion.

On the 12th of July, Hollins decided to give the offenders 24 hours' further notice to render satisfaction, and if this was not offered at the expiration of that time, to bombard the town. He accordingly, on the morning of that day, issued the following proclamation:

PROCLAMATION

To all men to whom these presents shall come, or to whom they may concern, greeting:

Know ye, that whereas certain gross outrages have, at sundry times, been perpetrated by the "authorities" (so called) and people of San Juan del Norte upon the persons and property of American citizens at that place and vicinity, and whereas a serious insult and indignity has been offered to the United States in the conduct of the said authorities and people towards Mr. Borland, United States minister to Central America, for which outrage and insult no indemnity has been given, and no satisfactory reply returned to demands already made:

Now, therefore, I, George N. Hollins, commander of the United States ship of war *Cyane*, by virtue of my instructions from the United States Government at Washington, do hereby solemnly proclaim and declare, that if the demands for satisfaction in the matters above-named, specified in the letter of Mr. Fabens, United States commercial agent, dated 11th instant, are not forthwith complied with, I shall, at 9 o'clock a. m., of to-morrow, 13th instant, proceed to bombard the town of San Juan del Norte aforesaid, to the end that the rights of our country and citizens may be vindicated, and as a guarantee for future protection.

GEORGE N. HOLLINS, *Commander.*

U. S. SHIP "CYANE,"

HARBOR OF SAN JUAN DEL NORTE, NICARAGUA, 9 a. m., July 12, 1854.

Copies of this proclamation Fabens caused to be posted in the three most conspicuous parts of the town, where they were

at defiance all warnings, as well as to satisfy the whole world that the United States had the power and determination to enforce that reparation and respect due them as a government, in whatever quarter the outrage might be committed. The property destroyed was valued by the inhabitants at $1,200,000.[13]

The Royal Mail-Packet *Dee* arrived in the harbor during the conflagration, but left immediately, taking in tow the *Bermuda*, thus leaving the English subjects referred to in Lieutenant Jolley's communication without any assistance. No communication from Lieutenant Jolley was made with the *Cyane* prior to his departure. But Hollins learned that Jolley carried with him a number of the principal participators in the outrages that had been committed by the town of San Juan, and among them was the former mayor, Mr. Martin. On the 14th, Mr. Fabens and his effects were removed to the *Cyane* for safe-keeping, and shortly afterwards the vessel departed for Boston.[14]

At the time these events took place, Greytown numbered about 300 inhabitants, of all sorts, consisting of a few Englishmen, Frenchmen, Germans, and men from the United States, but mainly of negroes from Jamaica and some natives of the Mosquito Shore. There were also two or three natives from the interior of Nicaragua. The Jamaica negroes constituted the majority, and exercised the greatest influence. At the last election and corporate organization, no American (except one mulatto man from New Orleans) was included. Of these people, some 75 to 100 could be mustered for military service, and they had in their possession three brass cannons—one 18-pounder and two 12-pounders—and about 200 muskets. With the exception of a few persons, these people owned no property, and had no ostensible means of livelihood. In their anomalous condition, without a government which any civilized nation could recognize, and occupying, indeed, by usurpation, territory which our government recognized as belonging to Nicaragua, and being, moreover, persons almost without exception of notoriously bad character, some of them discharged penitentiary convicts and refugees from justice, habitually manifesting evil dispositions towards our citizens, and indulging those dispositions to the injury of persons and property whenever they

[13] House Rept. No. 281, 36th Cong., 1st Sess.

[14] Senate Exec. Doc. No. 85, and House Exec. Doc. No. 126, 33d Cong., 1st Sess.

were not restrained by force, they could hardly be regarded in any other light than as pirates and outlaws, upon whom punishment to the extent of extermination might rightfully be inflicted by any hand that had the power.[15]

In Mr. Borland's opinion, at least, the interests of good government and humanity imposed the duty on any offended party of inflicting such punishment in a manner at once summary and effective.[16] "But it was a pitiable spectacle," says one historian, "to see a great republic wasting its powder on the miserable huts of these outlaws, while the real offenders against its dignity sat quietly by under the protecting folds of the Union Jack. The guns of the *Cyane* might with more justice have been turned upon the instigators of all the trouble."[17]

The foregoing is believed to be the only full and connected account of the bombardment and destruction of Greytown by the naval forces of the United States. Even Commander Parker, who served on board the *Cyane* at the time, and who published his "Recollections of a Naval Officer" in 1883, disposes of the episode in about four lines. He writes: "The *Cyane* returned to Greytown in 1854 and bombarded it. I have really forgotten on what grounds Captain Hollins did this; but it was a nest of pirates, and the pity is he did not destroy the inhabitants and spare the houses."[18]

[15] W. H. Parker, who was an acting lieutenant on board the *Cyane*, says: "The town at the time of our visit in the spring of 1853 was inhabited by a lawless set of desperadoes, of all nations, who had organized some kind of a city government. The mayor was said to have been an escaped convict from Sing Sing, and I believe it was so, for the others were evidently tarred with the same brush. They resembled the old buccaneers in everything save courage. These people made a living by preying upon the passengers passing to and from California, of whom large numbers were detained at Greytown a day or two at a time on their passage—more by design than by accident. Nearly every house was a hotel."—Parker, "Recollections of a Naval Officer," 164-5.

[16] Senate Exec. Doc. No. 85, and House Exec. Doc. No. 126, 33d Cong., 1st Sess.

[17] Scroggs, "Filibusters and Financiers," 77-78.

[18] Parker, "Recollections," 170. On July 31, 1854, in compliance with a joint resolution of both Houses of Congress, dated July 28, President Pierce transmitted the official documents in regard to the destruction of Greytown. These documents were printed as Senate Executive Document No. 85, and also as House Executive Document No. 126, of the 33d Congress, 1st Session.

Through the British, French, and German ministers at Washington, the citizens of Great Britain, France, and the Hanse Towns who sustained losses in the bombardment of Greytown tried to secure indemnity from the United States, but without success.[19] It remained, however, for certain citizens of the United States, some years later (in 1860), to petition Congress successfully with regard to the injuries suffered by them through the bombardment. These memorialists alleged that the criminal charges made against the community of Greytown were untrue, and had been fabricated by its enemies for the purpose of deceiving and misleading the United States Government; and they charged that the entire course of the naval and civil representatives of the United States then at Greytown was irregular and unwarrantable, and that they were entitled to indemnity for the losses sustained in consequence of said destruction of their property. The House Committee on Foreign Affairs, regarding it as the duty of a powerful nation to do exact justice to a feeble and unprotected people complaining of injury at its hands, and especially to examine whether citizens of the United States had been injured by their own government acting upon false or insufficient information, recommended the adoption of resolutions for their relief.[20]

[19] See Senate Exec. Docs. Nos. 9 and 10, 35th Cong., 1st Sess.
[20] See House Rept. No. 281, 36th Cong., 1st Sess.

[TO BE CONTINUED]

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

LETTERS ON NAVAL STRATEGY

BASED ON THE NAVAL CAMPAIGN OF 1805

By LIEUTENANT HOLLOWAY H. FROST, U. S. Navy

FIRST LETTER

1. INTRODUCTION

The German military writer Prince Kraft zu Hohenlohe-Ingelfingen in his well-known work "Letters on Strategy" describes several military campaigns from the point of view of the commanding generals. By careful and impartial criticism he shows how leaders have in some cases correctly applied the principles upon which the art of strategy is based. In other cases, where leaders have failed to apply correctly these principles, he shows the causes which have been responsible for their failure. Prince Hohenlohe gives us in this way an excellent exposition of the principles of military strategy and the various ways in which they should be applied in land warfare. As yet no one has covered the field of naval strategy in this way. It will be my object to do this.

While there are a great number of campaigns on land which could be used to illustrate the art of military strategy, there have been comparatively few on the sea which can be used for a study of naval strategy.

You must admit that the greatest naval campaign in history from the strategical point of view was that of 1805 between Napoleon and England. This campaign had the whole Atlantic Ocean for its stage, and it might well have spread into the Indian Ocean too had Napoleon wished it. More great leaders played parts in this campaign than in any other on the sea: on the French side was the master, Napoleon; on the English side were Pitt, Barham and Nelson. In addition, and this is most important for our purpose, it has been more carefully studied than any other campaign, and in recent years not only the facts, but even the detailed plans of the opposing leaders have been set forth by careful historians.

Julian Corbett, the well-known English writer, describes the campaign from the English point of view in his detailed work "The Campaign of Trafalgar." We may presume that the facts concerning the English forces, as he gives them, are accurate. However, his hatred of Napoleon is so apparent that his opinions regarding the French forces must be carefully considered before they are accepted. Colonel Desbrière of the French Army in his work "La Campaigne Maritime de 1805" covers the ground very thoroughly from the French point of view. Details may occasionally be supplied from Mahan, Jurien de la Gravière and James, while the Naval Chronicles give some valuable information as to the disposition of the English forces. The "Barham Papers" and "Blockade of Brest" give the English orders issued.

Having gained the facts from these authorities, I will proceed in my own way to deduce the conclusions from them. We will endeavor to see the various general principles of the art of naval strategy and the ways in which they were applied by the leaders in this campaign. In carrying out this program, it will not be my object to criticize the leaders for what might be considered mistakes. Such criticism is never profitable. In order to make a careful and impartial criticism, one must put himself in the place of the leader whose work he is examining, one must look at the situation from his point of view and with the information he had at the time. Also, one must take into consideration the fact that one can arrive at a correct decision more easily when he has no responsibility in the matter, than when the fate of a nation depends upon his actions. It is always easy for the looker-on at a game of chess or cards to see glaring mistakes on the part of the player. How much more so is this true of war, where the critic is out of danger and has no responsibility, while the admiral's decision may determine the course of the whole war! Napoleon once said that "people formed a very incorrect idea of the strength necessary to wage, with a full knowledge of its consequences, one of those great battles upon which depended the fate of an army and a country." If, therefore, we should see that such men as Napoleon, Barham and Nelson made what we, with our imperfect knowledge, might call mistakes, it should only prove to us how difficult it is to avoid them. If we expect to see a certain number of mistakes on the part of even these great leaders, we will be merely wasting time if we indulge in criticism of the

lesser leaders. I believe that none of you would wish to have me repeat the criticisms which have been leveled at the poor scapegoat Villeneuve for over a century, and the violent attacks which every English historian has made upon Napoleon's conduct in this campaign. Therefore, when it would appear that mistakes have been made, we will not criticize the leader who apparently made them, but will try to discover the causes for these mistakes, so that if any one of us is ever in a similar situation, he may have a hint as to how to avoid repeating them.

2. THE POLITICAL OBJECTS OF NAPOLEON AND ENGLAND

Strategy is so closely connected with policy, that we must begin our examination of the campaign with a rapid glance over the political situation. At the beginning of 1805, England was arrayed against a combination of France, Spain and Holland, at whose head was Napoleon. Naturally, the ultimate political object of each nation was the complete overthrow of the other. However, the attitude of the other European nations gave each an immediate object, as it might be called. The English saw that, although they might maintain a successful defence without the assistance of other nations, any real offensive against France was impossible without the assistance of continental nations. Therefore William Pitt, the very able Prime Minister, was trying to engineer a great coalition of continental nations against France. This great combination was to include Russia, Austria, Prussia, Sweden, Naples and Portugal. Pitt was assisted in his work by the alarm of these nations caused by Napoleon's aggressive policy, but was hindered by their fear of France and Napoleon. Each of the continental nations would have been glad to overthrow Napoleon, but as Napoleon was known to be treating with all of them, and offering them bribes for their services, each one distrusted the others and feared to take the initiative and declare openly against France, lest by the treachery or delay of the others, it would be left exposed singly to the might of France and the genius of Napoleon.

Thus England's great object was to organize this great coalition against Napoleon. Napoleon's object was naturally to strike down England before the continental nations could come to her assistance.

3. THE MILITARY MEANS OF GAINING THESE POLITICAL OBJECTS

You will say that it was naturally the task of policy and not that of strategy to organize the coalition. But you must admit that it was in this case too big a job for policy to handle. It would be rather a difficult job for the diplomat to induce any nation to declare against Napoleon at that time because, no matter what arrangements would be made with other nations to cooperate, this first nation was almost certain to have to stand alone against Napoleon on the land for some time, while the other nations looked on and saw the direction in which the events were marching before they lived up to their agreements. It is true that this first nation would have the assistance of England, but this, despite the great naval victories, had not thus far been of great advantage to the continental nations. These nations recognized the fact that England could, with her superior sea power, maintain a war for years without serious risk, but that they could not enter the war without running the risk of immediate and complete overthrow by the French Army. Therefore, to induce the continental nations to join the coalition it was necessary for England:

1st. To prove to the continental nations that she could assist them in the land warfare; and,

2d. To prove that she was confident as to the result of this land warfare, by taking such a position that she could not escape a great loss should this warfare result unfavorably.

The only way for England to do this was to send her entire army of regular troops to the continent. This would show that England could be of considerable actual assistance on the continent and would show that she was really in earnest. Thus the only effective military means by which England could gain her immediate political object was to cooperate on the continent with the armies of Austria, Russia and Prussia.

Napoleon had three military methods by which he might strike down England:

1st. An invasion in force of England.

2d. Operations against the English commerce.

3d. Operations against the English colonies.

Now we must see what forces Napoleon had available for the execution of these plans of operations. First let us examine the

strength of his naval forces, as these were naturally, from the character of the war, the most important. As the ships of the line composed the real battle force it is with them that we will be principally concerned. Ships of the line can be divided into three general classes:

1st. Three-deckers of from 120 to 98 guns.
2d. Two-deckers of from 80 to 64 guns.
3d. Fifty-gun ships.

If we take the two-decker as unity, we may count the three-decker as equal to two units. Corbett discusses this matter very fully and you may refer to him for the reasons which led him to this conclusion. While I believe the following proposal to be original, I think we might consider, without great inaccuracy, the 50-gun ship to be equivalent to one-half a unit. Thus in determining the strength of any squadron we will in our discussion consider:

1st. A three-decker as two units.
2d. A two-decker as one unit.
3d. A 50-gun ship as one-half a unit.

In addition to the ships of the line there were frigates, having from 44 to 32 guns, and corvettes, brigs, sloops and cutters. These classes of ships rarely took part in actions between ships of the line, and were used for scouting, carrying information, escorting convoys, and cruising singly to defend commerce and attack the enemy's commerce.

At the beginning of January Napoleon's forces were disposed as follows:

At the Texel, Holland: Six Dutch two-deckers..... 6 units.
At Brest, France: Three three-deckers, 18 two-deckers, all French..24 units.
At Rochefort, France: One three-decker, four two-deckers, all French ..... 6 units.
At Ferrol, Spain: Five French two-deckers..... 5 units.
At Cadiz, Spain: One French two-decker, *Aigle*..... 1 unit.
At Toulon, France: Eleven French two-deckers.....11 units.

This makes a total ready for sea in home waters of.....53 units.

In addition, there were in the East Indies one French two-decker, *Marengo,* and four Dutch two-deckers, five units in all; but the Dutch ships were in very poor condition and it is doubtful whether they were fit for active service. The Spanish Government had promised that by the end of March there would be at least 30 Spanish units ready for sea and [illegible] for Napoleon's use.

The principal land forces available for use against England were disposed as follows:

At the Texel, 25,000 men with transports, under the command of Marshal Marmont.

Near Boulogne, over 90,000, with a flotilla of over 1500 boats capable of carrying them to England, under the personal command of the Emperor.

4. THE DISPOSITIONS OF THE ENGLISH NAVAL FORCES

As the English Army was not ready on the 1st of January and would require at least three or four months' preparation before it could attempt operations on the continent, the English were reduced for the present to the strategical defensive. As Napoleon had several lines of attack, the English Navy had to be so disposed as to:

1st. Guard England itself from invasion;

2d. Protect as many as possible of the colonies; and,

3d. Protect as much as possible the oversea commerce.

Of these threats the most important was that of the invasion of England, and before anything else could be done, it was evident that an effective defence against this attack must be provided. As a means of local defence, a line of six old ships of the line were moored permanently along the English coast in the area through which the French flotilla must pass. On these were based a large number of small craft, which were backed up by a number of frigates. This local defence made it necessary for Napoleon to mass in the Straits a force strong enough to break it down. This French force naturally could not force its way into the Channel and maintain its position there for several days unless it were in turn supported by a battle fleet strong enough to drive clear the British battle squadrons. Thus Napoleon, if he desired to carry out the invasion project, must mass in the Channel a battle fleet so strong as to be able to maintain the control of the Channel for a number of days. Therefore you will say that the simplest way for the English to parry this most important attack would be to mass all their forces in the Channel, just as an army in a land campaign masses all its forces at the most important point. But while this would undoubtedly frustrate the Emperor's plan of invasion, it would give him a free hand to attack the English

commerce and colonies. The first strategic decision for the British Admiralty to make was whether it had a naval force sufficient:

1st. Merely to protect England against invasion; or,

2d. To repel in addition all attacks against their colonies and commerce.

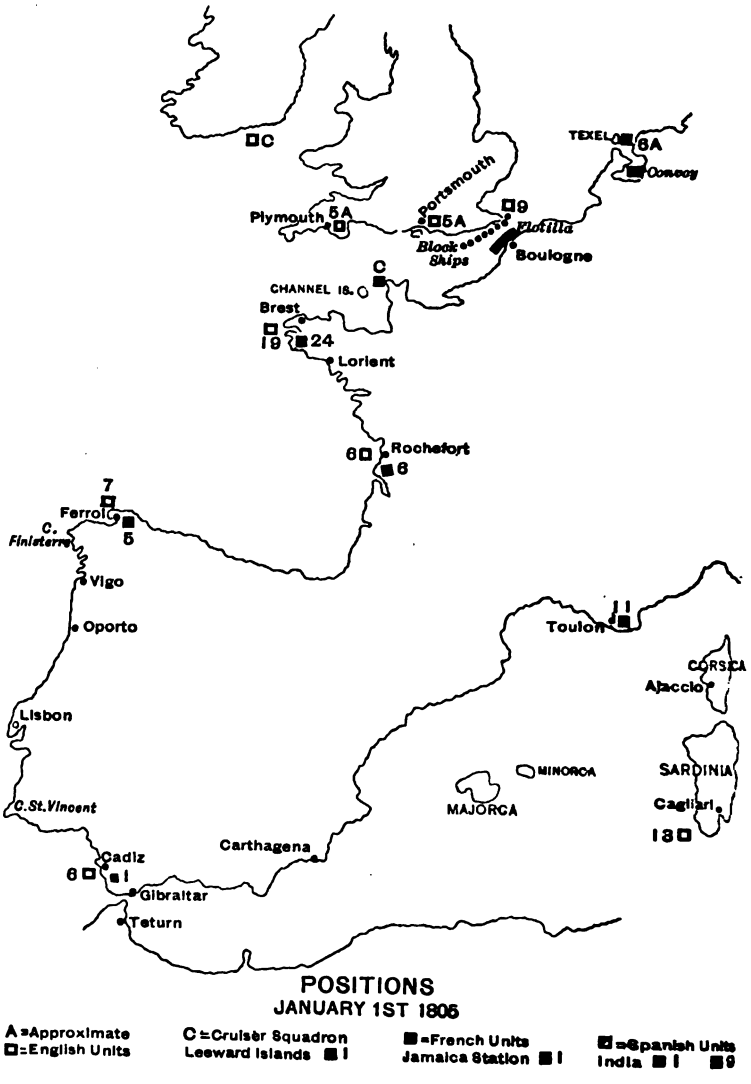
Although the English fleet had been greatly reduced before the outbreak of the war as a result of St. Vincent's controversy with the dockyard officials, and although the French had received the assistance of the Dutch and Spanish navies, so that the total opposing forces were nearly equal in numbers, the Admiralty's decision was that it had sufficient force to repel all forms of hostile attack.

The most satisfactory method of frustrating all forms of French attack was naturally to hold in port all Napoleon's sea forces. To accomplish this object an English squadron was placed off each port in which hostile forces were ready for sea. The English doctrine was to make the blockading force slightly superior in fighting power to the force in port.

The fighting power of a force depends upon its physical, intellectual and moral powers. In this case the physical power is measured by the number, size and condition of the ships. The intellectual and moral powers are measured by the intelligence and the resolution and spirit of the admirals, officers and crews. The condition of the English ships, excepting the Mediterranean squadron, was very much better than that of the French and Spanish ships. In intellectual and moral powers the English held a very great advantage over their opponents. The long periods at sea and the constant fighting for over 10 years had given them an excellent knowledge of seamanship, tactics and strategy, and their great naval tradition had instilled in them a wonderful fighting spirit and had given them a confidence in themselves, which gave them an almost incalculable advantage over their opponents. Their flag officers were without exception able and accomplished, and some were brilliant. The personal influence of Nelson alone has been estimated by Mahan to be equivalent to a reinforcement of three ships of the line.

On the other hand, the Spanish squadrons were just being organized and their ships being commissioned, while the French and Dutch ships had not been to sea for a long period. The excesses of the French Revolution had driven the best officers

from the service, and the discipline of the crews had never been completely restored after the mutinies in the first years of the



republic. Consequently, although there were many good officers and brave men in the Allied navies, as is shown so well by their hard fighting at Trafalgar, they were, as a rule, decidedly inferior

in intellect and resolution to the English officers and crews. The flag officers, although accomplished and personally brave, did not have the proper fighting spirit, and the traditions of their service had taught them to avoid rather than to seek battle. Finally, a fleet composed of ships of several nationalities was sure to be weakened by the jealousies which were certain to arise under such conditions.

Thus the mere numbers and size of ships alone can give no idea of the real relative fighting strength, because the English, with a considerably smaller number of ships, could, by reason of the superior quality of their personnel, count upon having equal fighting strength. It is naturally difficult to decide upon the relative fighting efficiency of the opposing forces, but we will probably be somewhere near the truth if we say that, when the units of the two opposing squadrons were equal in number, the English were superior in actual fighting strength in the ratio of approximately 4 to 3. Thus when you see Cornwallis blockading Brest with 19 units, while the French had 24 in port, you may assume that he is slightly superior. But you will note that the Admiralty rarely allowed Cornwallis' force to get as low as this, because it was a special policy of the Admiralty to maintain a considerable superiority at this most important position, and therefore they assigned to this squadron a minimum strength of 18 of the line. If we say that of these eight were three-deckers, this would give 26 units, a number approximately equal to that of the French force in port. Thus the English calculated that when their numbers were equal with those of the enemy, they had a superiority so great that defeat was practically impossible.

In accordance with their plan of blockading in port Napoleon's squadrons with English squadrons reasonably superior in fighting strength, the British Admiralty on January 1, 1805, had disposed their forces in European waters approximately as follows:

In the North Sea: Lord Keith with six two-deckers and six 50-gun ships, watching the Dutch division in the Texel and the Boulogne flotilla ..... 9 units.
In the Channel: Admiral Saumarez with a strong cruiser squadron ....
Off Brest: Lord Cornwallis, watching 24 French units in port, with approximately ..... 19 units.
Off Rochefort: Admiral Graves with one three-decker and four two-deckers, watching a similar force in port..... 6 units.

Off Ferrol: Admiral Cochrane with one three-decker and five two-deckers, watching five French units in port and Spanish ships preparing for sea ..... 7 units.

Off Cadiz: Admiral Orde with one three-decker and four two-deckers, watching one French unit and Spanish ships fitting out ..... 6 units.

Off Toulon: Admiral Nelson with two three-deckers and 11 two-deckers watching 11 French units in Toulon and Spanish ships fitting out in Carthagena..... 13 units.

This gave the English a total of ships actually on the blockade of ..... 60 units.

These forces, with the exception of the Brest squadron, were sufficiently strong for their purpose. In addition, there was on the Irish station a force of three two-deckers and a large number of cruisers.

You will probably say, from an examination of the positions of these numerous squadrons, that they were dangerously dispersed, that the English had violated the cardinal principle of concentration. We have all heard so much of "concentration," that the word has become a catchword, and every one who does not keep his entire force massed together in one body is accused of failing to "concentrate." We must always remember that the degree of concentration of a force is determined by the positions of the enemy as well as our own positions, and from an examination of the actual situation you will probably agree that the English were better concentrated than were the French. As long as the situation remained unchanged the English were sufficiently concentrated, because, except for their Brest squadron, which was, however, quickly brought up to strength, their blockading squadrons were always superior in fighting power to the hostile squadrons in port. This is emphatically proved by the fact that during the entire campaign not one of Napoleon's squadrons left its port with the intention of forcing battle upon the English squadron blockading that port, except in the one case of the battle of Trafalgar, in which case you must admit the English to have been decidedly superior. But now you may bring up the case in which a French squadron might leave port, avoiding the blockading force stationed off it, and fall upon an English squadron, very inferior to itself, engaged in the blockade of another port. It must be admitted that such a change in the strategi

situation was liable to occur at any time and that, if it should occur, it would place the weaker English squadrons in a position of grave danger. Of course, the apparent way to prevent such an occurrence was to maintain the very strictest blockade at the ports in which the strongest French squadrons were stationed. But assuming that the enemy were to escape without being brought to action, there were two ways in which the danger of being attacked by superior numbers could be met. First, each squadron, regardless of the exact position of its ships of the line, kept several cruisers off the port, so that the sailing of the hostile squadron could be quickly reported to the squadron commander, the commanders of the adjacent squadrons and to the Admiralty itself. Often, when two cruisers sighted the enemy coming out, one left immediately with this information, while the other tracked the enemy, so as to determine his destination. Second, each squadron disposed a number of cruisers in a wide area around it, so as to give timely warning of the approach of a hostile squadron. In case both these methods failed and a superior hostile squadron appeared without warning, the Admiralty relied on the skill of the English commander and his captains to withdraw from their less efficient opponents and to concentrate on adjacent English squadrons. As you will see in the course of the campaign, French squadrons often escaped and came upon very inferior English forces by surprise, but in no case were they able to come up with them so as to inflict serious damage.

When the Admiralty completed their organization of the blockading squadrons, as enumerated above, they still had a considerable reserve of ships, both in commission and under repair. Let us first consider the ships ready for sea in English ports. The Channel squadron, under the command of Lord Cornwallis, was composed of:

1st. The Brest blockading squadron, under his own command;

2d. The Rochefort blockading squadron, under Graves; and,

3d. A reserve in the Channel ports, taking on water and provisions and refitting, which relieved ships in the blockading squadrons when it was necessary for them to renew their supply of water and provisions.

It is very difficult to determine the number of ships in this reserve, as, of course, its composition was changing from day to day, and we can do no more than make a rough estimate of its strength at the beginning of January. We may arrive at this as follows:

For April 15, the Naval Chronicle gives the total strength of the Channel squadron as:

10 three-deckers.
14 two-deckers.
2 50-gun ships.
A total of 35 units.

We can assume with reason that this figure is fairly accurate for January 1. Thus if we subtract from it the 19 units of the Brest force and the six units of the Rochefort force, we have a remainder of 10 units, which we may assume to be the strength of the reserve. All ships of this force could leave port on 24 hours' notice.

In addition to this first reserve, as we will call it, there were, in what we will call second reserve, the following ships of the line:

Two ships under orders for the India station.
Four ships manned and ready to go into commission.
The *Hibernia*, 110, and the *Revenge*, 74, building and practically completed.
A total of nine units which could get to sea in from one to three weeks.

Finally there were 19 units in third reserve, a proportion of which could be placed in commission, depending upon the exertions of the English in making repairs and collecting crews.

We may now sum up the opposing forces in Europe as follows:

French and Allies:	
Ready for sea	53 units
Fitting out	30 units
Total (approximately)	83 units
English:	
Actually at sea	63 units
First reserve, ready in 24 hours	10 units
Second reserve, ready in three weeks	9 units
Total (approximately)	82 units
In addition third reserve (approximately)	19 units

On the foreign stations there were the following English ships of the line:

India Station (Admiral Rainier):

Five 74's
Three 64's
Two 50's
..... 9 units.

West Indies Station:

1. Leeward Islands (Commodore Hood): Two 74's..
2. Jamaica (Admiral Dacres): Two 74's.....
..... 4 units.

Total in full commission on foreign station (nearly all very old ships, and probably in poor repair).....13 units.

It is very possible that you will criticize this disposition of 13 units at such great distances from the main battle squadrons. You may even quote Napoleon as saying: "When you have resolved to fight, collect all your forces. One battalion may decide the day." If I admit that this is a true principle, then you will claim that the English blockading squadrons were "resolved to fight" should the French attempt to escape, and you will say that every possible ship should be used to reinforce the blockading squadrons up to their greatest possible strength. But if you resolve to fight, the enemy will often, on the sea, resolve not to fight, and will do his best to evade you. The question we must decide is whether a fleet in port may run the blockade without having to fight the blockading fleet, which is resolved to fight. If it cannot escape without a fight, then all ships should be used in the blockading squadron. If it has good chances of escaping, then under certain conditions it may be advisable to use a number of the ships to form squadrons on foreign stations as a second line of defence. Under the conditions of naval warfare to-day, it will be very difficult for blockaded squadrons to escape without a battle, and thus all the ships will under normal conditions be used in the blockading squadron—the first line. Under the conditions of naval warfare in 1805, on the other hand, it was very easy for small squadrons to run the blockade, and thus the use of a small number of the poorest ships as a second line on the foreign stations might under some conditions be justified.

Let us see just what the conditions were, and the chances for the enemy to undertake successful expeditions against the English colonies and commerce. First, take the case of India. This most important colony was at a great distance from home. If a hostile squadron were to leave France for an expedition in Indian waters,

it would get a great start before the English could determine its destination. The most important points on the route, Cape of Good Hope and Mauritius, were in Napoleon's hands and this would greatly assist a French squadron headed toward India and retard an English squadron in pursuit. The hold of the English in India was far from secure, even though the wars against Tippoo Sahib had been brought to a successful conclusion; and a small French landing force with the assistance of the natives might accomplish great results, if the command of the sea could be retained. That Napoleon would send out such an expedition certainly seemed probable, as his Egyptian expedition had been an attempt to reach India, and even in 1805 there were rumors, based on sound facts, to the effect that he intended to send a strong squadron to Indian waters. Finally, the presence of the *Marengo* and four Dutch ships of the line, poorly conditioned it is true, in the East Indies called for an equal English force to hold them in play.

While all the English possessions in the West Indies were within a comparatively small area, the steady easterly trade winds in reality formed two distinct stations, Jamaica and the Leeward Islands, as it required at least a month to beat against the wind from the former station to the latter. This fact practically doubled the forces required for their defence. While the West Indies were much nearer home than India, still about a month and a half was required for ships of the line to make the trip, and at least a month for fast cruisers. Thus, if a French squadron were to break the blockade and, avoiding contact, make for the West Indies, it would take about one and a half months for it to reach its destination, and another month for the news of its arrival to reach England. It would have a free hand in the islands for about two and a half months, in which time it should be able to achieve considerable results.

We may sum up the reasons for using the 13 units in question either with the blockading fleets or on the foreign stations as follows:

1st. By using them with the blockading squadrons they would:

(a) Assist in repelling the invasion of England; and

(b) Assist in repelling attacks against English commerce and colonies only if the attacking squadron could be intercepted when it left port.

2d. By using them on foreign stations they would:

(a) Not assist in repelling the invasion of England; but

(b) Would assist in repelling attacks against English commerce and colonies, should the attacking force not be intercepted when it left port.

Thus the use of these ships as a second line of defence for the English commerce and colonies could be justified only if the English forces in European waters were sufficiently strong, and would be sufficiently strong in the future, to defeat in battle all French and Spanish squadrons which might put to sea, either to assist in the invasion of England or to operate against English commerce and colonies. Whether the English blockading squadrons were sufficiently strong for this purpose at all times during the campaign is a matter upon which I would hesitate to give my opinion. They were certainly strong enough in the first part of the campaign, and it must have been a great relief to the Admiralty, when they received the reports of the escapes of Missiessy, Villeneuve and Allemand, to know that they had squadrons of heavy ships in Indian and West Indian waters. At the great crisis of the campaign, when the combined fleet of 30 units was at Ferrol, Lord Barham very possibly did not consider his forces in European waters entirely sufficient, and without doubt he would have been glad to have had the Indian and West Indian squadrons in the Channel. However this may be, it is certain that the English showed great confidence in their navy in thus maintaining such a large force in foreign waters. And it is also certain that, as it actually worked out, the results vindicated this confidence, for England was everywhere victorious on the sea.

SECOND LETTER

1. NAPOLEON'S FIRST MOVE

The most satisfactory operation for Napoleon was naturally to strike directly at England, to concentrate a superior force in the Channel to cover the crossing of the flotilla and of Marmont's force to England. This operation was also thoroughly in accord with Napoleon's principles of waging war. To effect this naval concentration, Napoleon had in Europe a total of 53 units, all French except the six Dutch ships in the Texel. As the English had at the beginning of the campaign 63 units actually at sea

and 10 more in the Channel ports ready to sail in 24 hours, and as the English were, ship for ship, considerably superior in efficiency to his own forces, it was evident that there was at present little hope for the success of his ambitious project. But by the end of March the Spanish had promised to have 30 units ready for sea, and when these ships were ready there would be far better chances of success. Therefore, you must admit that it was entirely proper for Napoleon to delay his major project until the Spanish ships would be available. As the major operation, therefore, could not be commenced at present, Napoleon had the choice of keeping his ships idle in port or of using them in minor operations against the English commerce and colonies. These operations, if successful, would have a certain moral effect, would allow the French ships to be shaken down by long cruises at sea, would train the personnel, and might deceive the English as to his ultimate purpose and draw away English squadrons from the more important European stations at the time when the major operation would commence. Napoleon, therefore, rather than allow his ships to lie idle in port, decided to use several of the French squadrons in minor operations, which might rather be called "raids." The raids, however, were not to interfere with the major operation, the invasion of England; for Napoleon was very careful to provide that all ships used in the raids should be back in their home ports in time to take part in this operation.

Napoleon, therefore, issued orders for the Rochefort and Toulon squadrons to sail for the West Indies. In making a detailed statement of the various orders issued throughout the campaign, I will follow a regular form:

1st. The assumption made as to the probable intentions of the enemy.

2d. The general plan assigned to our own forces.

3d. The detailed instructions to each one of the subdivisions of our own forces.

In practically all cases, the assumption and the general plan were not embodied in the actual orders, only the instructions to the subdivisions being given.

Napoleon's order will therefore be put in the following form:

CAMPAIGN ORDER NO. 1. ABOUT JANUARY 5

1. Assumption as to enemy intentions—None.

2. General plan—To raid the English colonies in the West Indies, thus drawing English forces there from Europe.

3. (a) The Rochefort squadron, Rear Admiral Missiessy, to sail for the West Indies at a set date, avoiding the blockading squadron, and meet the Toulon squadron there.
   (b) The Toulon squadron, Vice Admiral Villeneuve, to sail at the same time, and pick up Missiessy in the West Indies.
   (c) The united force to operate against the English colonies and commerce in the West Indies until the early spring, when they should return to Ferrol, rally the 15 ships which would be there ready for sea by that time, and proceed to a French port.
   (d) If only Missiessy should reach the West Indies, he was to reinforce the French garrison at San Domingo with the troops he carried and then return home.

Thus this plan was designed not only as a blow at the English commerce and colonies in the West Indies, but also to form a concentration of about 35 units in a French port for the major operation itself. At the same time that the above order was sent out, Napoleon issued the following:

SPECIAL ORDER. ABOUT JANUARY 5

Admiral Ganteaume to leave Brest with his entire squadron, make a descent upon the Irish coast, sail around Scotland and join the Dutch squadron in the Texel.

While we have no proof, it appears very probable that this order was given out especially for the benefit of the English spies and that its execution was never intended.

In accordance with his orders Missiessy sailed from Rochefort on January 11. His squadron consisted of the following ships:

Majestaeux	120 guns.
Magnanime	80 guns.
Lion	74 guns.
Suffren	74 guns.
Jemappe	74 guns.
A total of	6 units.

Five cruisers. On the ships were 3500 troops.

When Missiessy left port, the English blockading force under Graves very fortunately happened to be at Quiberon Bay, about 130 miles northwest of Rochefort, taking on stores, only two cruisers remaining on watch off the port. The French squadron ran into a heavy storm and was very severely damaged, but Missiessy resolutely kept on his way. The English cruisers followed Missiessy through the first part of the storm, and seeing the great damage received by the French squadron, left to inform Graves.

The storm prevented the cruisers from reaching Graves until January 16, six days after Missiessy had left port. By this time the French squadron was so far on its way that there was no chance for Graves to intercept it.

Now suppose that you were in the place of the English Admiralty, what course of action would you take? First you would have to determine the destination of the French squadron. It is impossible for you to say that it must have one of a certain set number of destinations, but you might say that its actual destination would most probably be one of the following:

1st. A French port in the Bay of Biscay.
2d. The Mediterranean.
3d. The West Indies.
4th. India.

A return to a French port in the Bay of Biscay, caused by damage received in the storm, would renew the original situation. A move into the Mediterranean would very probably be intercepted by Orde with six units of the Cadiz blockading squadron, but if Orde could be evaded and the Mediterranean be reached, the French would have 17 units there as against 13 for Nelson, not counting the Spanish ships fitting out at Carthagena. A move to the West Indies could not be intercepted by any English squadron, and would give the French six units as against the four old 74's the English had there. A move to India would give the French seven units there to the English nine, not counting the four Dutch ships which very probably were not ready for sea. Thus we see that the West Indies was the danger point for the English, as it was on that station that the French had the greatest chance of inflicting damage upon the English commerce and colonies. Now perhaps you will say that the Admiralty should have immediately sent a squadron to the West Indies on the assumption that Missiessy was headed in that direction. I cannot agree to this, as it would have been a blow in the dark based on a mere guess, and not sound strategy. On the other hand, I claim that the Admiralty now gave an excellent example of the manner which to methodically clear up an obscure strategic situation. They decided to clear up in turn each possible course of action of the French squadron. In deciding upon the course of action to clear up first they took the one which would lead to a destination nearest to England because:

1st. This course could be cleared up in the shortest time; and,

2d. It was highly desirable to retain the force, detached in pursuit of Missiessy, as near the Channel as possible, until all destinations in European waters had been covered and it was practically certain that Missiessy was bound for a foreign station. A false move to a distance, unless it was certain that Missiessy was being followed, might mean the loss of a number of units for several months, thus playing into Napoleon's hands, if he really intended to carry out operations in home waters.

In accordance with these sound principles the Admiralty decided:

1st. To cover the possibility of a return to a French port in the Gulf of Biscay.

2d. To cover the possibility of a move toward the Mediterranean.

3d. To cover the possibility of a move to the West Indies.

4th. To leave India out of consideration for the present.

In accordance with this plan orders were given to look into all French ports in the Gulf of Biscay to determine the presence of the Rochefort squadron. As Cornwallis had been driven off his station by the storm the following ports had to be examined:

Brest, Rochefort and L'Orient.

By reason of exceptionally poor weather conditions it was not until about February 7, nearly a month after Missiessy had sailed, that it was determined that he had not returned to any of these ports. Thus the first possibility had been cleared up, and a squadron, equal to Missiessy's, could be safely sent away from the Bay of Biscay in pursuit of it, first clearing up the possibility of a move toward the Mediterranean, and then that of one toward the West Indies. Accordingly, the Admiralty gave the following orders to Cornwallis, who had in the meantime called in Graves to the main body of the Channel squadron off Brest:

CAMPAIGN ORDER NO. 1. FEBRUARY 7

1. Assumption—Missiessy en route toward the Mediterranean or the West Indies.
2. General plan—To follow Missiessy with a superior force.
3. (a) Cornwallis to send Rear Admiral Calder with six units to relieve Rear Admiral Cochrane off Ferrol.

(b) Cochrane with his entire force of seven units to go to Lisbon for information and to speak to Orde off Cadiz. If he heard that Missiessy had entered the Mediterranean, Cochrane was to reinforce Nelson with his entire force.

(c) If there were no news of Missiessy, Cochrane was to touch at Madeira and then at the Cape Verde Islands for news. If he received reliable information as to Missiessy's destination, he was to follow him. If he received no news, he was to assume that he had gone to the West Indies, and sail for Barbadoes.

(d) There were other instructions regarding his actions after he arrived in the West Indies which we will consider later.

In accordance with these orders Calder relieved Cochrane in the last week of February, and the latter sailed for Lisbon. His squadron consisted of the following ships of the line:

St. George	98 guns.
Northumberland	74 guns.
Eagle	74 guns.
Atlas	74 guns.
Spartiate	74 guns.
Veteran	74 guns.
A total of	7 units.

Cochrane touched in turn at all the points ordered, and, receiving no information of Missiessy, sailed for Barbadoes, where he arrived April 5. Missiessy had arrived at Martinique on February 20, just a month and a half before. Thus the Admiralty, by using sound and methodical strategy had lost a month and a half before the move of the enemy could be countered. Thus we see that the side which holds the initiative is always ahead of the enemy in the matter of time, because the latter has always to discover the move of the former and then make arrangements to counter it. If the side on the defensive does not wish to lose time, then he must make a stab in the dark, based upon a mere guess of his opponent's intentions. Thus the side having the initiative has always a great advantage, and this advantage is especially great in naval warfare, where it is so difficult to determine the intentions of the enemy. In land warfare one side may act on the offensive, take the initiative and retain it throughout the campaign. In war on the sea there is a peculiar condition which makes this impossible. The stronger side may act on the offensive and retain the initiative as long as the opposing forces keep the sea, but when they retire into securely fortified ports, then the stronger side must change from the attack to the defence, and the initiative

passes over to the enemy. Thus the stronger side, while it may gain the temporary command of the sea, can never gain a definite decision over the enemy naval force, unless the enemy gives him the opportunity, and not only is he prevented from gaining a definite decision, but he must pass over to the defensive and give the advantage of the initiative over to the enemy, who may select the time and the place for further operations.

Let us now see how events were marching in the Mediterranean. On January 17, six days after Missiessy's escape, Villeneuve sailed from Toulon for the West Indies in accordance with the Emperor's orders. His squadron was composed of the following ships of the line:

Bucentaure	80 guns.
Neptune	80 guns.
Formidable	80 guns.
Indomptable	80 guns.
Pluton	74 guns.
Mont-Blanc	74 guns.
Berwick	74 guns.
Atlas	74 guns.
Swiftsure	74 guns.
Scipion	74 guns.
Intrepide	74 guns.
A total of	11 units.

In addition he had nine cruisers, and he had embarked on his ships a large number of troops.

At the time of Villeneuve's sailing Nelson was at Maddalena Islands at the northern point of Sardinia with all his ships of the line, 13 units in all. Two of his frigates were watching Toulon in his absence. Villeneuve, upon leaving port, steered for the southern point of Sardinia. He ran into a very severe storm which caused great damage. The two English frigates followed him through the storm until the early morning of the 19th, when the French squadron was in the latitude of Ajaccio, Corsica, steering SSW. At this point they left for Nelson, whom they reached after dark that same day. As one French ship was forced to put into Ajaccio dismasted, and as three other ships were disabled, and all the other ships in very bad condition, Villeneuve decided the same day to return to port. He reached Toulon on the 21st without further loss. All his ships, including the one dismasted, were able to get back safely.

Now place yourself in Nelson's position and estimate the situation on the night of the 19th, when he received the reports of his frigates. The first plan which would occur to you, and one which Nelson surely must have considered, would be to head directly for the French fleet and force battle upon it. This would solve all his problems, if the French squadron could be found. But how was it to be found? No English ship was still with it to give him further information of its movements. If he were to guess at the probable course and speed of Villeneuve and set a course to intercept him, it would be a mere blow in the dark, with the chances in favor of Villeneuve's escaping without detection. If Nelson were to miss the enemy by such a move, so much precious time would be wasted that Villeneuve would have a long start on his way to the place selected for attack. Thus Nelson had a problem very similar to that which the Admiralty had been required to solve after Missiessy's escape. His solution was exactly similar to that made by the Admiralty. He recognized three general courses of action open to Villeneuve:

1st. An attack upon English possessions in the Mediterranean.

2d. A return to port, due to damage received in the storm.

3d. A move out into the Atlantic.

In case the French returned to port, then they would be so damaged that they would not be able to undertake any operations for some time, so no immediate danger would result from this course of action. In case they had left the Mediterranean, they would fall upon Orde and Cochrane and would be in a position to do the English great injury, but as Nelson was responsible for the Mediterranean station it would certainly not be proper for him to leave it until he was certain that the French had left it, especially as Villeneuve's course so far to the eastward would seem to indicate that he was about to attack English possessions in the Mediterranean, and as Napoleon, that master of deception, had been moving troops into Italy, as if to embark them for an oversea expedition. Thus if Nelson were to clear up the situation logically and methodically it would be proper for him to:

1st. Take a position with his ships of the line to cover the English possessions in the Mediterranean.

2d. To reconnoiter Toulon with cruisers, with a view to determining the presence of the French squadron.

3d. After it was proved that the French squadron had left the Mediterranean, to leave a few cruisers on the station and follow it with the remaining force.

This was exactly Nelson's decision.

The English possessions, or rather those belonging to allies and thus under English protection, can be divided into two groups:

1st. The center Mediterranean group: Sardinia, Sicily, Naples and Malta.

2d. The eastern Mediterranean group: Greece, Corfu, Turkey and Egypt.

The most natural and the easiest way for Nelson to protect all these widely scattered territories was for him to hold the line: Corsica-Sardinia-Tunis. If he observed this line with his frigates, and took up a position with his squadron at the southern end of Sardinia, he could probably intercept Villeneuve and force battle upon him. This then was Nelson's plan. Sending out his frigates to observe the line, he got under way immediately and stood down the eastern coast of Sardinia. On the 22d he had reached a point 50 miles east of Cagliari, a city at the southern end of Sardinia, when one of his frigates reported that a French frigate had been sighted standing into that port. Nelson naturally believed that this ship was accompanying the main French force and at once headed toward it. But here a strong westerly gale sprang up and prevented him from reaching Cagliari until the 26th. Here he discovered that no French ship had been in port. On the next day word was received that a French ship of the line had put into Ajaccio. Neglecting the possibility of a move into the Atlantic it was now practically certain that Villeneuve had either put back into port or passed between Sardinia and Tunis, which part of the line the storm had prevented the frigates from covering. Nelson personally believed that Villeneuve had gone back to Toulon, but if this was so all was well no matter what he did. Therefore he assumed that Villeneuve had passed south of Sardinia. If Villeneuve had taken this course, he had two possible moves:

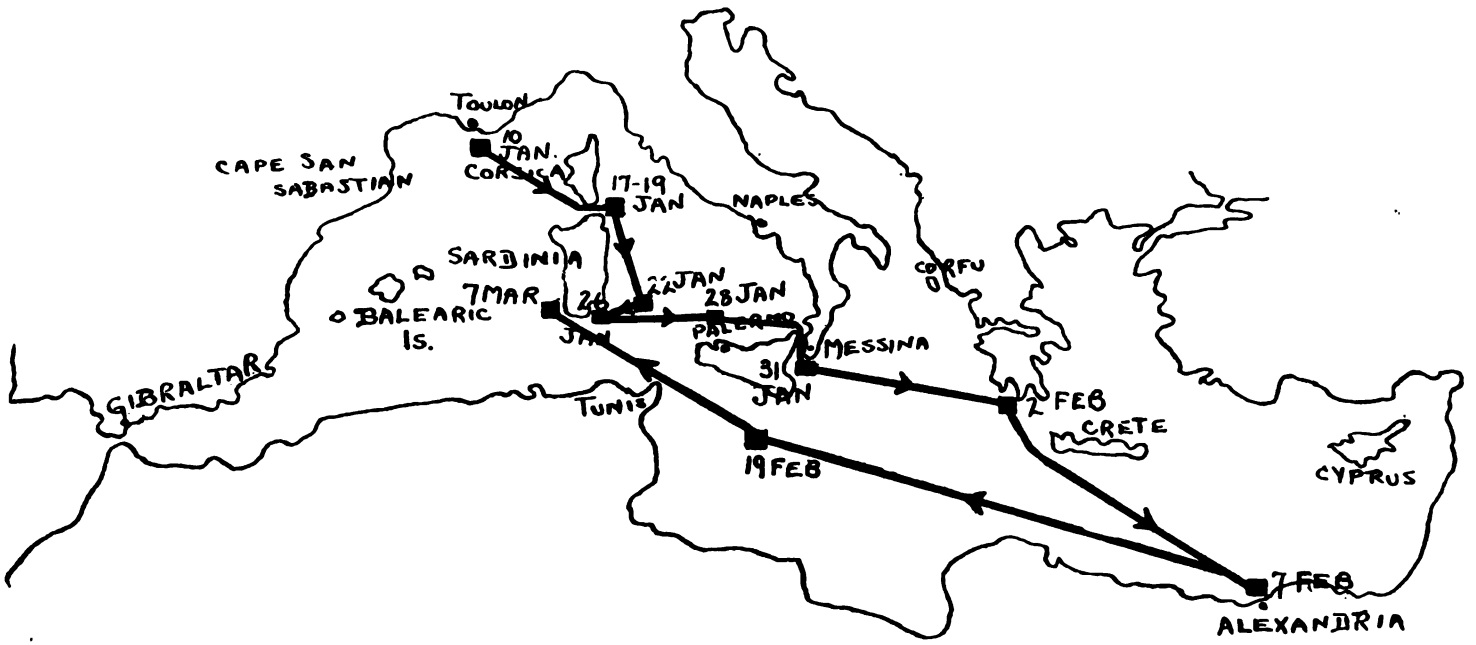
1st. A course to the northward of Sicily for an attack against Sicily or Naples.

2d. A course to the southward of Sicily for an expedition into the eastern Mediterranean.

Nelson naturally determined to clear up the first course, as this could be done quicker. He therefore went to Palermo, arriving there on the 28th. By this time it was practically certain that the middle Mediterranean was secure. The next course of the enemy to cover was that to the southward of Sicily into the eastern Mediterranean. Therefore, Nelson, sending back three frigates to reconnoiter Toulon, kept on through the Straits of Messina for Greece. Touching there, he received no news of Villeneuve, but heard that France had broken off relations with Turkey. This made it look as if Villeneuve had gone to Egypt, but when he arrived at Alexandria, there was no news of the French. Nelson hurried back to Sardinia. Arriving there about the beginning of March, he heard that Villeneuve was back in Toulon. Provisioning his ships, he was back off Toulon on March 13 with all his ships of the line. Nelson had acted in accordance with sound strategic principles. He had left nothing to chance and had made no blow in the dark where failure to find the enemy would have disastrous results. He had gone to each threatened point in turn with his whole force, and had waited at each point until he could eliminate one of the enemy's possible courses of action. When he finally proved that the French squadron had not passed the line Corsica-Sardinia-Tunis, then he had gone back to Toulon. If Villeneuve had not been there, his next move would have been to have left the Mediterranean in pursuit. When we see that, even though Nelson acted correctly, Villeneuve, if he had been able to have kept on through the Straits, would have gained a start of two months, we have an additional proof of the value of the initiative and of the time required for the defender to counter the move of the attacker. Even as it turned out, Villeneuve, by a mere feint at a move, had been able to send Nelson completely around the Mediterranean.

Ganteaume's orders, which were probably never intended to be executed, were countermanded.

Napoleon's first plan had failed. Its greatest weakness was that it required two squadrons to break their blockades almost simultaneously. In order to have reasonable chances of success in breaking the blockade, which was very efficiently maintained by the English squadrons, a squadron required very favorable weather, usually a storm with a favorable wind. It would very rarely happen that two widely divided squadrons would both have these



NELSON'S FIRST MEDITERRANEAN CRUISE, 1805.

favorable conditions at nearly the same time, and still more unlikely that both would escape without mishap, because the very gale which would allow them to escape would be liable to cause them very severe damage. Thus if one squadron had one chance in two of escaping in favorable weather, there would be but one chance in four for two squadrons to escape simultaneously, even if each had favorable conditions. But as one squadron would usually have to sail under unfavorable conditions, there would be about one chance in six for the success of the combination.

In this case luck had favored the French, as Graves had been off his station, and as each squadron had favorable weather, but still the odds were too great and the combination had failed on account of the damage the storm had inflicted upon Villeneuve's squadron.

But if the combination had failed the success of Missiessy had a certain advantage. He had a month and a half to operate in the West Indies before he would be opposed by superior forces. He had drawn away from the most important area, the Channel. Cochrane with his seven units, which were not to return during the campaign. Missiessy himself had plenty of time to return to France to take part in the major operation, or he might fill a part in it by waiting on his station, to join Ganteaume and Villeneuve. Thus the first operation had slightly improved the situation for Napoleon's major operation against England.

[To be Continued]

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE FOUNDING OF OUR NEW NAVY

By Rear Admiral Caspar F. Goodrich, U. S. Navy

In the early eighties of the last century, the navy of the United States had almost disappeared. What was left of it in ships was rapidly passing away through the operation of the laws prohibiting repairs to its vessels when the estimated cost was, at first, 25 per cent, then, later, 10 per cent, that of a new vessel. Yet out of the ashes of the old wooden navy arose the modern steel navy. To whom is the credit due for the manner of this re-birth? To this question I am, possibly, the only living person who can supply the answer.

When President Garfield assumed office he appointed Judge William H. Hunt, of Louisiana, Secretary of the Navy. The latter was appalled by the condition and paucity of the ships under his charge. In the spring or early summer of 1881, Secretary Hunt invited the late Rear Admiral Bancroft Gherardi, U. S. Navy, then a captain, to accompany him on a trip from New York to West Point (as I remember) on a government tug. Gherardi, at that time on duty at the New York Navy Yard, was an old acquaintance of Hunt's, both coming from New Orleans. In addition to the pleasure of Gherardi's company—and he was a most delightful man in every way—Hunt sought a quiet opportunity to obtain, from this friend, in whom he had full confidence, a word of advice as to what should be done to restore the navy to a sound state. In fact, after explaining the desperate situation and his earnest desire to remedy it, he plainly asked Gherardi what, in his place, Gherardi would himself do, and expressed his entire readiness to be guided by such counsel.

In effect Gherardi replied as follows: "Mr. Secretary, I do not feel either willing or competent to suggest exactly the steps you ought to take to accomplish your excellent purpose. Of course, I have my own opinions and, if you wish them, they are freely at your disposition, but I do not feel that it is well

that you should be influenced by any one person, no matter how firm his convictions and wide his experience. You have honored me by asking what I should do were I in your place—a very different matter. In that case, I should trust to no single individual, but would form a board composed of the ablest available officers of the line, the engineer corps and the construction corps. To this board I would refer the whole subject, both as to general policy and types of vessels required. In this way I would get the benefit of the best brains in the service, after which, I should adopt the recommendations of this body of experts and seek to carry them out. I should then be able to move in the full assurance that I was doing the very best thing possible."

Such, in substance, is the story I heard from Gherardi's own lips soon after the occurrence of the episode here related.

It is of common knowledge that what Gherardi suggested, Hunt did. With President Garfield's approval he formed the first advisory board. Rear Admiral John Rodgers was its president. To Rodgers were joined eight other line officers; three engineers, Isherwood, Loring and Manning; three constructors, Lenthal, Wilson and Hichborn. Their report formed the basis of the navy's reconstruction.

The excellent work of Secretary Chandler and the second naval advisory board, authorized by the Act of 1882, the far-seeing vision of Chandler's successor, Secretary Whitney, which made possible the establishing of an armor plant at Bethlehem, etc., are all matters of history. While recognizing the wisdom of Secretary Hunt in going to a trustworthy source for counsel and in acting promptly and forcefully upon that counsel, in justice to the memory of my dear and modest friend I claim that the admirable manner in which the navy of to-day took practical shape is, unquestionably, due to my old commander, Bancroft Gherardi. He it was who planted the seed from which has grown this mighty tree.

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A NEW METHOD OF USING ALTITUDE AND AZIMUTH TABLES TO OBTAIN A SHIP'S POSITION AT SEA

By LIEUTENANT ABNER B. CLEMENTS, U. S. N. R. F.
Class of 1879, U. S. N. A.

In the old navigation we worked our sights solely for longitude and latitude. We took a set of sights for latitude either on the meridian or near the meridian or at a known time from the meridian and reduced it to the meridian, or we took a set of sights of a body on the prime vertical or near the prime vertical, and, assuming a latitude, worked out the corresponding hour angle and thence the longitude.

After discovery of the Sumner line we saw that our sights did not give us the true positions that we thought they did. That the latitude sight did not give us an exact latitude unless the body observed was exactly on the meridian, that if off the meridian the result was affected by our guess as to the longitude. And, that our longitude sight gave us longitude only when the body observed was exactly on the prime vertical, otherwise the longitude obtained depended largely upon our guess at the latitude.

The new navigation took into account all this, and is founded upon the fact that an altitude of a celestial body simply gives us the radius of the circle upon which is located the observer. Bearing in mind that when this radius is over 10° of arc, such a portion of the circle as may include all possible positions of the observer is to all practical purposes a straight line, the new navigation treats it as a straight line, at right angles to the line of bearing of the observed body, since the arc of a circle makes a right angle to the radius at every point; and plots the position on the chart, or computes the position from the length of this radius, which is the zenith distance of the observed body. If the earth were a plane, or if we had a chart of the earth on which we could lay off

this distance as a straight line, we could plot the position of the observed body by its hour angle from Greenwich and its declination as though these were terrestrial longitude and latitude, and with the zenith distance as a radius lay off the line of position at once without computation. But as this would require a chart about 60 feet square it is impracticable. The best we can do is to compute, or in some other way arrive at, and plot a part of a circle with a radius approximating to the observed zenith distance and then lay off on the line of bearing the difference between this approximate radius and the true radius or observed zenith distance.

In the method of Saint-Hilaire we assume a position, and with this position as one point and the position of the observed body determined by its declination and Greenwich hour angle as the other, we can compute the great circle distance between the two. The difference between this distance and the observed distance shows us how much our assumed position is in error, and we then lay off from our assumed position the amount of this error, on the line of bearing of the observed body, taking the direction of the line of bearing from the azimuth obtained from observation or from the Azimuth Tables.

The method of Saint-Hilaire utilizes tables of haversines in this computation and by avoidance of plus and minus signs relieves the solution from ambiguity, but otherwise it has no advantage; in fact, some disadvantage as compared with the old altitude and azimuth problem and which gave both the altitude and the azimuth in one solution.

The so-called newest navigation of de Aquino is a republication by him with improved methods of use of the tables of Sir William Thompson, afterwards Lord Kelvin, for the ready solution of the old altitude and azimuth problem.

The old way of solving the altitude and azimuth problem was by Napier's rules, which were, that in a right-angled spheric triangle if we consider that triangle as made up of only five parts ignoring the right angle, these parts being the two sides, the complement of the hypotenuse and the complements of the two oblique angles, the sine of the middle is equal to the product of the tangents of the adjacent parts or the product of the cosines of the opposite parts.

Since these rules are general, we see we can go around a right-angled spheric triangle as we please, choosing any part as the

middle part, and the above proportion still holds so long as we are careful to observe the relation of adjacent parts and opposite parts to the middle part.

To solve an oblique-angled spheric triangle then, we simply divide it into two right-angled spheric triangles and solve by Napier's rules.

In the solution of the old altitude and azimuth problem we dropped the perpendicular from the observed body upon the meridian passing through the observer and solved by the formulæ obtained from Napier's rules:

$$\sin (90^\circ - t) = \tan \phi \tan d, \text{ whence } \tan \phi = \cot d \cos t. \quad (1)$$

$$\left.\begin{aligned} \sin h &= \cos a \sin (L+\phi) \\ \sin d &= \cos a \cos \phi \end{aligned}\right\} \text{whence } \sin h = \sin (L+\phi) \sin d \sec \phi. \quad (2)$$

$$\left.\begin{aligned} \cos (L+\phi) &= \tan a \cot Z \\ \sin \phi &= \tan a \cot t \end{aligned}\right\} \text{whence } \cot Z = \cos t \cos (L+\phi) \operatorname{cosec} \phi. \quad (3)$$

Sir William Thompson about 1876 published a table giving the values of parts of right triangles for each even degree, and published a method of using them substantially the same as method I of de Aquino.

Lieutenant de Aquino carried the tables to 30′ on the perpendicular, and provided columns for the interpolation and used the letters of astronomical triangle and carried them in various combinations showing the various ways in which the tables could be used, instead of leaving the K and Q of Lord Kelvin and the application to be worked out by the navigator in each case. However, the manner of using the tables was essentially the same, and both followed the old altitude and azimuth problem and dropped the perpendicular from the observed body upon the meridian of the observer. In the old altitude and azimuth problem the perpendicular was dropped in this way, because of greater convenience in calculation. The rule was that the perpendicular should be dropped from the end of a given side and opposite a given angle, and generally to be so dropped as not to split a wanted part. Consequently, as the position angle was not wanted and the azimuth was, the perpendicular was so dropped as to split the position angle and not the azimuth. But when the calculation is not to be made, as in the use of the tables of Lord Kelvin and Lieutenant de Aquino, the reason for dropping the perpendicular in this manner no longer holds.

The tables published as Table VI in H. O. 200, and there credited to Lieutenant Radler de Aquino, were published about 1876 by Lord Kelvin, then Sir William Thompson. Lieutenant de Aquino merely devised a more convenient way of using them. The following is an explanation of a much more convenient way than that given by either Lord Kelvin or Lieutenant de Aquino:

Table VI of H. O. 200 is a table of right-angled spheric triangles. The special use of such tables is in the solution of oblique-angled spheric triangles, the oblique-angled spheric triangle being divided into two right-angled spheric triangles by means of a perpendicular let fall from the end of a given side and opposite a given angle.

In the method of Lord Kelvin and in the various methods of Lieutenant de Aquino, the astronomical triangle is divided into two right-angled spheric triangles by dropping a perpendicular from the observed body upon the meridian of the observer.

It is, however, more convenient to drop the perpendicular from the zenith upon the meridian passing through the observed body, even though this violates the rule against dropping the perpendicular so as to split a wanted part.

Fig. 1 represents the astronomical triangle projected upon the plane of the horizon. Then, using the ordinary notation of navigation, PZM_1, PZM_2, PZM_3 and PZM_4 represent the various cases that may arise.

In PZM_1, the hour angle is greater than 90°:

$$mM_1 = mP + M_1P = 90° - b + (90° - d) = 180° - (b + d),$$

and the angle $PZM_1 = mZ\ M_1 - MZP = \beta - a$.

In PZM_2, mP is greater than M_2P, d$>b$:

$$mM_2 = mP - M_2P = 90° - b - (90° - d) = d - b,$$

and the angle $PZm_2 = mZP - mZM_2 = a - \beta$.

In PZM_3, mP is less than M_3P, $b>d$:

$$mM_3 - M_3P - mP = 90° - d - (90° - b) = b - d,$$

and the angle $PZM_3 = mZP + mZM_3 = a + \beta$.

In PZM_4, where the declination is of opposite sign to latitude mP is less than M_4P, $b>d$ (regarding d as negative):

$$mM_4 = M_4P - mP = 90° - d - (90° - b) = b - d,$$

and the angle $PZM_4 = mZP + mZM_4 = a + \beta$.

Whence we have the rules:

1. Where t is greater than 90° (enter the table with $180°-t$): $C=180°-(d+b)$ and $Z=\beta-\alpha$.
2. Where t is less than 90° and $d>b$: $C=b\sim d$ and $Z=\alpha-\beta$.
3. Where t is less than 90° and $b>d$: $C=b\sim d$ and $Z=\alpha+\beta$.

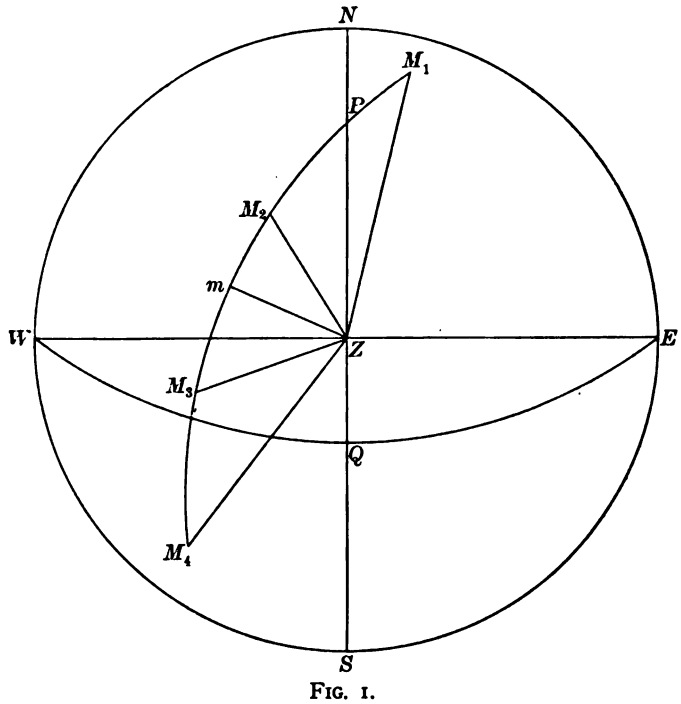

FIG. 1.

$PZ=90°-L.$
$PM_1, PM_2, PM_3, PM_4=90°-d.$
$Pm=90°-b.$
$mM_1, mM_2, mM_3, mM_4=90°-B=C.$
$ZPM_1, ZPM_2, ZPM_3, ZPM_4=t.$
$PZm=\alpha.$
$mZM_1, mZM_2, mZM_3, mZM_4=\beta.$

An easy way to apply these rules is to note that if we always egard the declination as measured from the upper branch of the quator, then in all cases $C=b\sim d$, and we have the single rule:

When the hour angle is greater than 90° take $180° - t$ instead of t and $180° - d$ instead of d; then, $C = b - d$. β has the sign of C and $Z = \alpha + \beta$.

Z is always measured from the elevated pole regardless of sign, to the east or west as the hour-angle is the east or west.

By this method we reduce the four cases and four rules of de Aquino to a single case and a single rule, and we are able as the first step and without interpolation to take out the latitude and hour angle which give us the plotting position, and we get the declination of the foot of the perpendicular and the first part of the azimuth on the same line in the table also without interpolation. The declination of the foot of perpendicular is in even degrees, so we combine it with the declination of the observed body mentally and get C ($C = b - d$), which we find at the same opening of the page and next to the second part of the azimuth. As both parts of the azimuth are in degrees and tenths we combine then mentally ($Z = \alpha + \beta$) and plot the line of bearing with this azimuth through the plotting position, then in the same line we take out the altitude by a simple interpolation in the same column in which we found the latitude and lay off the difference between it and the true altitude at once on the line of bearing.

The method of using the tables is as follows: Regard d as the latitude and Z as position angle, α and β as the two parts of the azimuth. Enter the tables from *below* with the nearest value to the dead reckoning latitude as d and hour angle as t and take out α to the nearest 30′. Re-entering the tables from *above* with this α take out the nearest latitude (in d column) and hour angle without interpolation, these give the assumed position to be used instead of the dead reckoning position. On the same line with these take out b and α, combine b with the declination ($C = b - d$) and obtain C. From C by a simple interpolation get h_c and β and combining α and β get Z, the azimuth. Comparing calculated altitude h_c with the observed h_o gives the altitude difference, which is laid off from the assumed position on the line determined by the azimuth either toward or away from the observed body, as the observed altitude h_o is greater or less than the computed altitude h_c. Thus draw a line of position or Sumner line at right angles to the line of bearing.

Example 1.—January 11, 1918, a. m., sextant altitude of sun's lower limb, 12° 10′ 40″ bearing S. and E.; W. T., $8^h\ 53^m$ 0[illegible].

C—W, $7^h\ 55^m\ 50^s$; C. C., $1^m\ 55^s$; height of eye, 18 feet; I. C.+ 1′ 30″; approximate position, latitude 38° N., longitude 122° 16′ W.

SOLUTION IN DETAIL

	h m s		
W. T. obs. + 12 hrs.	20 53 06	Dec.	21° 51.8′
C—W	7 55 50	Corr.	.3
C. C.	1 55	C. Dec.	21° 51.5′ S.
G. M. T.	4 47 01		
Eq. T.	7 56.2		
G. A. T.	4 39 04.8		
G. A. T. arc	69° 46′ 12″		69° 46′ 12″
Long.	122 16		
Local H. A. = t =	52° 30′ E.	Tab. H. A.	52° 16′ E. (p. 253).
a = 38° 30′ (p. 253).		Longitude	122° 02′ 12″ W.
		Latitude	38° 05′ (p. 253).
Obsd. alt. ⊙	12° 10′ 40″		
I. C.	1 30		
Corr.	7 54		
h_o	12° 20′ 04″	b = 52° (— 253)	a = 51.8 (p. 253).
h_o	12° 20.1′	d = 21° 51.5′	
h_o	12° 34.4′ (p. 252).	C 73° 51.5′	β = 79.9 (p. 252).
$h_c - h_o$	14.3′ away on line of bearing, Z = 131.7′.		

With latitude 38° in d column find a 38° 30′ corresponding to t 52° 30′.

Then with a 38° 30′ at top of page take out 38° 05′ and 52° 16′, the latitude and hour angle of plotting position, and opposite them note a = 51.8′ and b = 52°, which, combined with declination 21° 51.5′, gives C = 73° 51.5′. Opposite C 73° 51.5′ by interpolation take out h_c = 12° 34.4′ and β = 79.9°, then the difference between the true altitude and h_o is the altitude difference 14.3′ to be laid off from plotting position away from sun on line of bearing, Z = 131.7°.

It will be seen that all this requires no computation, but will be done by the navigator mentally at one opening of the tables when he is ready to plot his position on the chart.

Example 2.—May 23, 1918, during p. m. twilight; sextant altitude of star α Leonis (Regulus) is 66° 18.2′ bearing S. and W.; W. T. obs., $6^h\ 45^m\ 18^s$; C—W, $4^h\ 18^m\ 02^s$; C. C., $-3^m\ 45.5^s$; I. C., 0.0; height of eye, 39 feet; dead reckoning position, latitude 34° 38′ N., longitude 65° 12′ W.

SOLUTION IN DETAIL

	h	m	s	
W. T. obs.	6	45	18	W.
C. W.	4	18	02	
C. C.	—	3	45.5	
G. M. T.	10	59	34.5	
R. A. M. S.	4	02	57.5	
G. S. T.	15	02	32.0	
R. A.	10	04	02.6	
G. H. A.	4	58	29.4	

	h	m
R. A. M. S.	4	01
Corr.		1
R. A. M. S.	4	02

G. H. A. arc	74°	37′	21″
Long. W.	65	12	
t_{DR}	9°	25′	21″
a =	8°		

G. H. A. arc	74°	37′	21″
ta		9 44	
Long.a W.	64°	53′	21″
Lat.a N.	34	37	00

Obs. alt.	66°	18.2′	
Corr.		6.6	
C. alt.	66°	11.6′	
h_c	66	03.4	
$h_o - h_c$		8.2′	towards

Dec.	12°	21.9′	N.
b =		35	
C =	22°	38.1′	

on line of bearing, Z = 155.9

a = 84.4

β = 71.5

With latitude 34° 30′ in d column at bottom of page a 8° 00′ opposite t 9° 30′ (p. 248). Then with a 8° 00′ at tc page 212 take out 34° 37′ latitude $h \setminus d$ column and 9° 44′ angle in $Z \setminus t$ column the latitude and hour angle of plotting tion, opposite them note $a = 84.4$ and $b = 35°$; combine b w and get C, $C = b \sim d = 22° 38.1'$ and corresponding to this val C find $\beta = 71.5$ and $h_c = 66° 03.4'$, page 213. The diffe between this $h_c = 66° 03.4'$ and the observed $h_o = 66° 11.6'$ i which lay off towards the star on bearing $Z = a + \beta =$ N. 155.9 and draw line of position at right angles to that bearing.

In practical work the navigator will, after obtaining his app mate hour angle and corrected altitude and declination, tak tables and plotting chart, and following down the column he a in the tables he will take out the latitude and hour angle and the plotting position, then noting a, will run up the C column $b - d$ and note β which he will combine with a mentally and the line of bearing, then opposite C in $h \setminus d$ column he will int late for h_c, which, compared with his corrected altitude, will the altitude intercept which he will lay off on the line of be and he will then draw the Sumner line or line of position thr the point thus obtained at right angles to line of bearing.

If the navigator wishes to report his position immediately after taking his sight, he can assume a watch time of observation and with this compute the hour angle and approximate latitude, and enter the tables and plot his line of bearing on the chart. Then applying the corrections for the observed altitude to the altitude taken from the tables with opposite sign, he is ready to lay off his altitude intercept immediately after taking sight without other calculation than a simple subtraction to get the difference between the observed and computed altitude.

to the point at which the value of a to the nearest 30′ is taken out. The next step is as follows: "Reentering the tables from above with this a and with the given d, by a simple interpolation the corresponding values of b and t are obtained." There are here two distinct interpolations, one for b and one for t, which if carried out completely involve eight separate arithmetical processes—three subtractions, two multiplications, two divisions and one addition—and the writing down of over 50 figures. The use of a slide rule will expedite this work considerably, but there still remain the addition and subtractions. The interpolations could be reduced to their simplest terms and performed mechanically by the use of a simple contrivance based on the principle of similar triangles. A rough sample instrument of brass and wood was therefore constructed in a machine shop with the aid of a milling machine, and the saving of time and mental labor resulting from its use seemed to warrant its further development.

The essential elements of the instrument are: (1) A rigid right-angle triangle; (2) a graduated sliding scale or ruler, free to move right, left, up or down, but always parallel to one side of the triangle, similarly graduated; and (3) a rotating arm made of transparent material pivoted at the point of intersection of the other two sides of the triangle and with a ruled line on its surface passing through the pivotal point. Fig. 1 illustrates the construction. The three sides of the triangle may be designated the base, the fixed scale and the hypotenuse. The triangle is mounted on a board, and raised above its surface high enough to allow space for the moving parts beneath it. Also fastened rigidly to the board is a fixed groove or track, parallel to the base. In this track slides a short bar on which is mounted at right angles another groove or track in which slides the sliding scale. Since the fixed scale is perpendicular to the base, the sliding scale must be parallel to the fixed scale. The sliding scale moves under the triangle, leaving just enough space between for the motion of the transparent rotating arm. The entire length of the fixed scale represents 1° divided into 60′. The sliding scale is twice as long and bears on its right edge 2° divided into 120′, each of the same length as 1′ on the fixed scale. In this way it is adapted to the conditions obtaining in Aquino's tables. The graduation of the fixed scale is based on the fact that b is given in whole degrees. The graduation of the sliding scale is based on the fact that successive values of d never differ by more than 1°, and those of

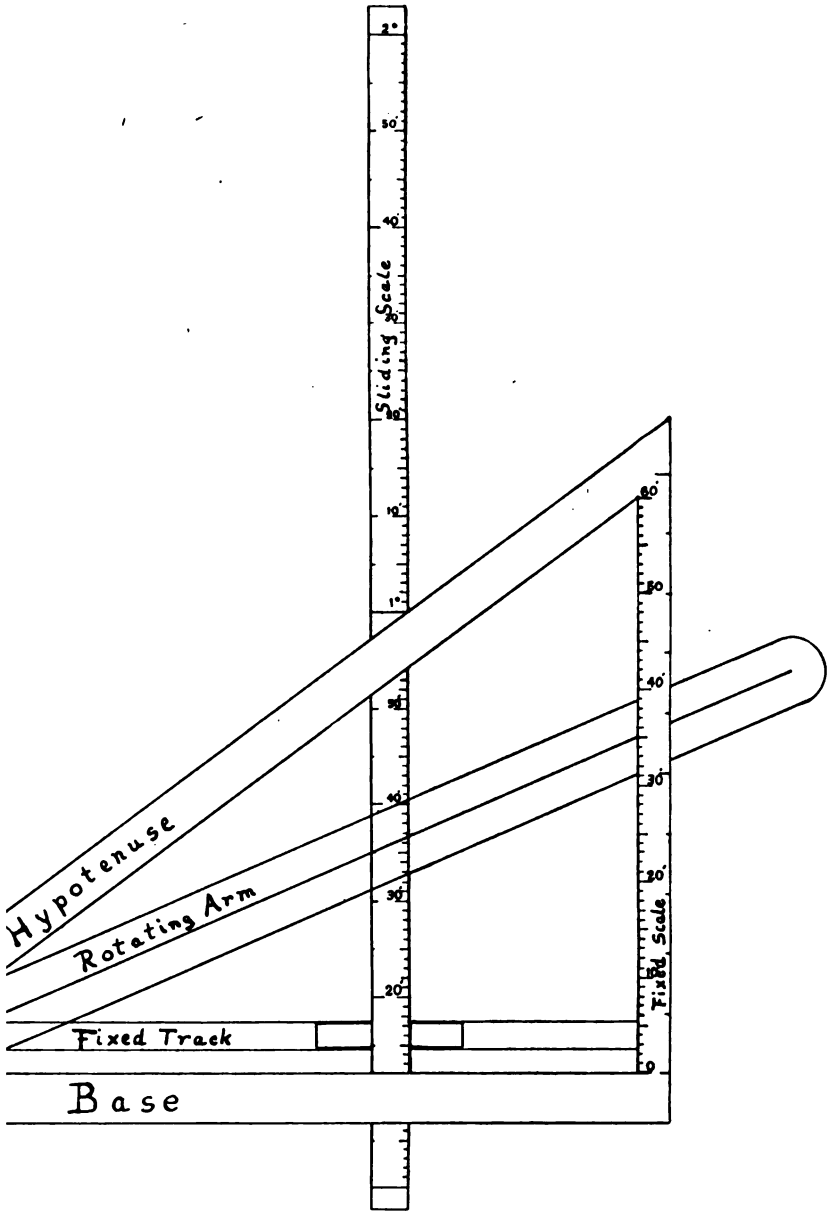
Sliding Scale
Hypotenuse
Rotating Arm
Fixed Track
Base
Fixed Scale

FIG. 1.

only do so in a small portion of the tables, the treatment of which will be considered presently.

In the operation of the instrument the sliding scale is taken to represent values of d, while the fixed scale represents values of b; the sliding scale is then reset to represent t. The procedure is as follows: The values of d next above and below the given value are found in the tables. The sliding scale is moved up or down until the number of minutes in the value *below* the given value is at the intersection with the base; this number appears twice on the sliding scale, once in each of the two degrees; the lower should be selected. The sliding track (in which the sliding scale lies) is then moved to right or to left in the fixed track, without disturbing the up and down set of the sliding scale, till the number of minutes in the value of d *above* the given value is at the intersection with the hypotenuse. The rotating arm is then swung till the indicator line on its surface crosses the sliding scale at the given value of d. The indicator line will then cross the fixed scale at the mark which indicates the desired number of minutes in b, the number of degrees being given in the b column of the table. Then, without disturbing the set of the rotating arm, the sliding scale is reset according to the values of t in the table corresponding to the values of d below and above the given value, and the desired value of t is directly read from the point on the sliding scale at which it is intersected by the indicator line.

This procedure will perhaps be made clearer by an example. Suppose we have given $a=39°\ 0'$, $d=21°\ 11'$; the problem is to find b and t. The part of the table in which these values are found is as follows:

b'	d	t
27°	20° 40′	42° 16′
28	21 24	42 32

The sliding scale is set so that the base intersects its right edge at 40′ in its lower half (the bottom being assumed as 20° 0′, the middle point as 21° 0′, the top as 22° 0′), it is then moved laterally till the hypotenuse intersects it at 24′ in the upper half. The rotating arm is swung till the indicator line intersects the sliding scale at 11′ in its upper half. Then it will be seen that the indicator line meets the fixed scale at 42.3′, thus giving 27° 42.3′ as the value of b. The sliding scale is then moved upwards till the base intersects it at 16′, and to the left till the hypotenuse in

sects it at 32′ in the same half of the scale (*i. e.*, the same degree). The indicator line now crosses the sliding scale at 27.3′, showing the value of t to be 42° 27.3′. It will be seen from this that the entire operation of obtaining the values of b and t is performed with five simple motions, which with a little practice can be performed rapidly.

The accuracy of the instrument depends on the dimensions, the workmanship in construction, and the care with which it is manipulated. It is very easy to make an instrument of the dimensions of the sample, 7″ x 5″, or even smaller, accurate to less than 0.1′. With such an instrument readings can be made to this degree of accuracy if care is taken in setting the scale and the rotating arm. In practical navigation, however, where an error of 0.2′ or even 0.5′ is unimportant, time can be saved by rapid setting of the moving parts, which can be done very quickly to the nearest half minute, and results good enough for the purposes of the navigator obtained with great speed.

Using the crude instrument, I have made comparative tests to determine the approximate saving of time. To this end a number of values of a and d were written down at random. The time was taken from the moment these values were looked at and the search in the tables begun to the moment the values of b and t to the nearest minute were written down in columns prepared for them. One series of 10 was done with the interpolation after very little practice, and another series of 10 using arithmetic; a third series of four was later carried out with a 10-inch slide rule. The results were as follows: Time with interpolator varied from 120 to 85 seconds, average 101 seconds; time with slide rule 2 minutes 55 seconds to 2 minutes 14 seconds, average 2 minutes 35 seconds; time with arithmetic, 6 minutes 27 seconds to 1 minute 50 seconds,[1] average 4 minutes. This shows a saving of time over the slide rule amounting to approximately 1 minute, and over arithmetic amounting to 2 minutes 20 seconds. The test, moreover, does not show the full possibilities of time-saving, since with practice one could greatly reduce the time required to operate the instrument; in my own case far more than would be possible

[1] The instance in which, without instruments, the procedure was completed in 1 minute 50 seconds was exceptional. In this case the figures were such that the answer was obvious on inspection and no written calculations were required. The next shortest time was 3 minutes 29 seconds.

with either of the other methods. With practice it shoul possible to perform with the interpolator the entire oper (*i. e.*, beginning with the search in the table and ending writing down the desired values) in a minute. I doubt if could perform the same operation, using a slide rule, in less 2 minutes, except in those cases in which the figures happ be such that it can be done readily in the head. In short, possible with an instrument not much bigger or more expe than a slide rule, to increase the saving of time by Aqu method from $3\frac{1}{2}$ to $4\frac{1}{2}$ minutes.

It was noted above that in a small portion of the tables succe values of t differ by more than 1°, a fact which would ma impossible to use the scale as described in dealing with valu this part of the table. This difficulty is of minor importan it never occurs when d is less than 45° and only in a minori combinations when d is more than 45°. The only heavenly b used by navigators in the northern hemisphere whose declin exceeds 45° are Capella and four second magnitude stars inclu Polaris. Thus in the use of the sun, moon and planets this culty could not arise, and even in the use of these few sta could arise only in a minority of observations. But most of minority can be simply dealt with by engraving on the left-l side of the sliding rule a different scale with smaller degrees minutes, so that the space available may comprise more than For instance, this extra scale could be made to include 6° in entire length, thus making a span of almost 3° available betw the hypotenuse and base with the scale at the extreme right. T would adapt the instrument to declinations up to 71°, wh would suffice for all the brighter stars except Polaris, and Pola is usually treated with a different formula. It would be unwi to make the scale smaller for the sake of the insignificant numb of instances in which the difference between successive valu of t exceeds 3°, both because the minutes would be too small read accurately, and because in this part of the table t is no lon a linear function of b.

It was mentioned in the beginning that this instrument co be readily adapted to interpolation with other tables than Aqui *e. g.*, logarithms and all the trigonometric functions. To end there could be marked on the outer edge of that side of triangle designated the "fixed scale" another scale in which whole distance was divided into 100 parts instead of 60. To

with this there could be supplied as many differently graduated sliding scales, to replace that described, as might be needed.

SUMMARY

An instrument is described, based on the principle of similar triangles, with which interpolations from mathematical tables can be performed mechanically with a minimum of labor. A sample has been made, designed especially for the interpolations required in Aquino's method of obtaining line of position. This method has been reported as saving 3½ minutes when compared with the usual method of applying the Saint-Hilaire procedure. It is estimated that with the aid of this instrument at least a minute more could be saved.

DISCUSSION

COMMANDER E. B. FENNER, U. S. Navy.—As an instrument for general use in the interpolation of linear functions Lieutenant Forbes' machine has the serious fault of requiring a number of different scales for use with different tables and the shifting of scales necessary would seem to deprive it of its one claim to value, increased speed.

For use with the Aquino tables this difficulty is practically non-existent and "for those who like that sort of thing, it is doubtless just the sort of thing they would like." Personally, I do not like the Aquino tables and have never been able to find the gain of 3½ minutes in time claimed for them in a single sight, while in working out and plotting a cross of three star sights I have found that the Aquino requirement of plotting a different assumed point for each sight wipes out most of the gained time.

The Aquino method of computation is admittedly somewhat less accurate than the standard Marcq Saint-Hilaire formulæ, the plotting of long altitude differences necessitated by this method introduces further chance of error, and the use of the interpolating instrument seems to result in still another rather small inaccuracy, but the results are claimed to be "good enough."

In the past 10 years a multiplicity of new methods and new gadgets for ase in navigation have appeared, practically all of which have involved a possible gain in speed and reduction of labor at the expense of a certain ss in accuracy, and it seems to me that this tendency should be checked. With the present size and value of our fleet units and the unavoidable difficulties of navigation under war conditions no amount of labor is too great if it will, even in slight degree, reduce the danger of catastrophe. If the multitude of odd jobs that have been piled on the shoulders of the navigator ake it impossible for him to devote sufficient time to his primary duty, en some one else should take some of the odd jobs. One battleship is too rge a factor in our battle strength to make "*good* enough" a proper motto or our navigators so long as "better" is practicable.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

USE OF UNIVERSAL DRAFTING MACHINE FOR PLOTTING DEAD RECKONING

By LIEUT. COMMANDER G. M. BAUM, U. S. Navy

No doubt every navigator has had the usual race against time to work up his dead reckoning for a noon or near noon sight after a forenoon of maneuvering. The problem which confronts the navigator is the obtaining of an approximate dead reckoning position for an assumed point in the shortest time possible. The universal drafting machine offers a ready and simple solution.

The method described below is probably being used by many navigators, and no claim for originality therein is made. It is believed, however, that officers who may be ordered as navigators in the future may benefit by this description. Furthermore, no claim is made that it is the best method, but the writer has found it the best he has ever used.

First prepare a table giving the distance in miles and tenths of miles run for elapsed time of every minute from 1 up to 60, at speeds ranging from the lowest to the highest maneuvering speed of the ship. Paste this on a board or piece of cardboard for convenience.

The scales furnished to ships with the universal drafting machine are graduated on one edge in inches and tenths of inches, and on the other edge in inches and one-sixteenths of inches. For convenience, assume the scale to be one inch equals one mile. Use the scale graduated in inches and tenths of inches.

Have the quartermaster on watch keep an accurate record of all changes of course and speed, no matter how slight the change of course or short the time, in a loose-leaf notebook. The advantage of having a loose-leaf notebook lies in the fact that one or more leaves may be detached and sent to the navigator in the chart-house, and the record resumed on a new page, without breaking the continuity of the record.

Take an arbitrary point anywhere on the chart or plotting sheet, whichever is being used, off to one side and clear of the work, to represent the last plotted position or starting point. From this point lay down the distances run on the various courses, using the scale of the universal drafting machine. The scale is naturally larger than that of the chart or plotting sheet, but you are working with the scale of one inch equals one mile on the scale, and therefore must temporarily disregard the scale of the chart. No matter how short the distance run may be, the large scale enables its being plotted. Having plotted the track of the ship from the data in the notebook, lay the edge of the scale to cut the initial point and the point of the last plot. This gives the course made good. The distance between the two points is the distance made good, which can be readily read off in miles. Clamp the scale and move it to your last dead reckoning position and lay off the course made good. With dividers step off the distance made good, first converting the distance run, to the scale of the chart or plotting sheet in use.

The method outlined above does not take into account the advance and transfer on a turn, but these are comparatively so small that they may be disregarded.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Lack of Material

Due to the limited number of essays and articles received for publication, it has been necessary to shorten that part of the PROCEEDINGS devoted to original subject matter.

Prize Essays 1919

The attention of all the members and the subscribers to the U. S. NAVAL INSTITUTE PROCEEDINGS is invited to the new rules governing the Prize Essay contest for 1919 under the heading of Special Notice in this number. It is requested that authors who are writing or who contemplate writing essays submit them at their earliest convenience, as the Institute is in pressing need of articles for publiction in the PROCEEDINGS.

Topics for Essays

The board of control invited the Chief of Naval Operations, Commanders-in-Chief of the U. S. fleets, Chiefs of Bureaus, Presidents of the U. S. Naval Institute and Naval War College, and the Superintendent of the U. S. Naval Academy to suggest topics for essays. The suggested topics received to date will be found opposite the Special Notice, and the list will be added to as the suggestions are received.

Membership

Since March 36 regular members, 2 associate members and 1 life member have joined the Institute. Total membership 4901.

Deaths:

Rear Admiral J. D. Ford, U. S. N., retired.

Civil Engineer C. A. Bostrom, U. S. N.

Resignations: One.

Address of Members

Several hundred copies of the PROCEEDINGS have been returned, because of the lack of proper address, *all members are urged to keep the Secretary and Treasurer informed of the address to which* PROCEEDINGS *are to be sent, and thus insure their receipt.*

This precaution is now of particular importance as notices of changes of stations are not now available for the use of the Institute's staff.

Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 10th of each month.

Dues

It is requested that members who have not paid their 1918 dues of $2.50, do so at their earliest convenience.

Book Announcements

Due to freight embargoes, scarcity of paper and binding cloth and the drafting of many of the printers' experienced employees, the Institute is experiencing difficulty in supplying the demands for books published by the Institute. Every effort to fill the orders of members and subscribers is being made and will continue to be made. In cases where books are out of stock but are expected within 10 days time the orders are placed on file, otherwise the money is refunded.

Due to a delay in receiving the approved manuscript for the Landing Force Manual U. S. Navy 1917, the Manual will not be ready for issue until about August 1, 1918.

The Naval Artificer's Manual has been revised and will be ready for issue about June 15, 1918.

The revision of the "School of the Ship" has been delayed indefinitely.

Discount on Books

The five per cent additional discount allowed to purchasers of books whose accounts during a calendar month amounted to a hundred dollars or over has been discontinued.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations

Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Suggestions Invited

Members are invited to send to the Secretary comments, suggestions or criticisms on the make up of the PROCEEDINGS, and to submit topics for essays.

Notice

Whole Nos. 145, 146, 147, 149, 155 and 166 of the PROCEEDINGS (March, 1913, June, 1913, September, 1913, January-February, 1914, January-February, 1915, and November-December, 1916) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

ANNAPOLIS, MD., May 8, 1918.

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PREPARED BY

LIEUTENANT WM. B. JUPP, U. S. Navy

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CHILE

TO RELEASE HUN SHIPS FROM CHILEAN PORTS.—The agreement which has been pending with Germany for the release of three of the German merchantmen which have been laid up in Chilean ports during the war has been completed. Germany has stipulated that the vessels must be used to carry cargoes only to neutral ports. Metals, saltpeter and other products will be exported.—*Star*, 5/3.

CHINA

CHINA TO SEND 40,000 TO FRANCE BY SUMMER.—Capt. Ting Chia Chen, military counselor to the President of China and also to the Chinese minister of war, has arrived here on a French steamship. He said that China now sending troops to France to fight for the Allies.

Captain Ting, who is a graduate of the United States Military Academy at West Point, for some time has been in Europe as a military observer in the war theater for his government.

"China is preparing to do her part in making the world safe for democracy," he said to-night.

"It is true that China has troops now on the way to the battle front, and it is the calculation of the Peking Government to have no fewer than 40,000 fighting men with the French by early summer. I have just left France, and there remained behind me ten other Chinese officers, whose duty it will be to select training camps in France for Chinese troops."

The captain added that there is a spirit among the Chinese people that Prussianism must be suppressed for the good of mankind and the advance of civilization.—*Ev. Star*, 30/4.

GERMANY

GERMANY BUILDS MINE-LAYING CRUISERS.—New mine-laying cruisers of 4000 tons displacement and a speed of 35 knots are among the recent additions to the German Navy according to reports. The figures given out are believed to be exaggerations, since a supply of 480 mines is said to be carried, each weighing close to a ton, and four 5.9- and eight 4.1-inch guns are also said to be the armament.

Sixty destroyers, it is declared, have been launched since the war was declared. Their speed is 34 knots and their armament is increased to three 4.1-inch guns and six torpedo tubes. Indications are that the German building program has made the navy stronger in every class save that of light cruisers than it was when war was declared.—*Naval Monthly*, May.

HEAR GERMANY HAS SIX SUPER-SUBMARINES.—Information received in an official quarter in Washington credits Germany with having completed the construction of six super-submarines of 1500 to 1800 tons capacity, with a cruising radius of 10,000 miles, and that six more U-boats of the same design are being rushed toward completion.

Germany has designed the newer submarines, it was said, to be superior to destroyers. It was said that the allied Admiralties have known for more than three months of the actual construction of these super-submarines, which, it is believed, follow on general lines the construction of the commercial U-boats, one of which, the *Deutschland*, visited the United States.—*N. Y. Herald*, 28/4.

GERMAN SUBMARINE WARFARE EXTENDED.—The Swedish Minister at Berlin has announced that Germany will sink all neutral ships, regardless of the flag they fly, if the country to which they belong has made a tonnage agreement with the Allies, or if the major part of the cargo is destined for an allied country.

Dutch, Norwegian, Swedish, Danish and Spanish ships are likely to be affected by this new decision. It will probably increase the number of total sinkings, but it is not thought that it will raise the amount of lost tonnage materially. Holland, Sweden and Denmark have been shipping little stuff in neutral bottoms to allied countries in many months. Norway and Spain, however, have been carrying on a considerable business.—*Nautical Gazette*, 11/5.

TEUTON COMMANDERS AT ZEEBRUGGE AND OSTEND DECORATED.—"In connection with the splendidly carried out defence against the British attempt to blockade Zeebrugge and Ostend and land at those ports," says the *Berlin Vossische Zeitung* in its edition last Sunday, "a shower of orders has rained upon various persons. Commanding Admiral Schroeder has been decorated with the Swords of the Red Eagle of the First Class. Chief Berlet, of the General Staff of Marines, has been awarded the Red Eagle of the Second Class, with Swords, and Captain Schuette, commander of the batteries on the mole, with the Knight's Cross of the Royal Order of Hohenzollern, with Swords."

The newspaper says the Germans lost only eight killed and sixteen wounded in the fighting.

According to the *Amsterdam Telegraaf*, the German casualties were 300, of which 70 were killed or died of their wounds.—*N. Y. Herald*, 7/5.

GERMANY PLANS SEA RAID.—Germany is preparing for a vast sea raid supplementing her west front drive, according to information gathered officially by the navy.

While not verified, the reports were that unwonted activity is evident at the Teuton naval bases, and that all movements tended to show preparations for an offensive ahead of any allied smash.

The navy advices, similar in many respects to press messages out of Berne, may be German-inspired with a view to disturbing American-Allied morale. But, whether they are only German propaganda or not, they were regarded sufficiently plausible by navy authorities to take seriously and to prepare against such a drive.—*Naval Monthly*, May.

SAYS ALL REICHSTAG BACKS U-BOAT WAR.—Speaking during the naval estimates debate in the Reichstag Committee, Count von Westarp, the conservative leader, says a Berlin despatch, declared that with the exception of the independent socialists the committee was unanimous that the unrestricted submarine warfare must be continued by all means and in the sharpest manner.

They were agreed likewise, said the speaker, that the building of U-boats must be continued to the utmost possible limit, regardless of the duration of the war. This program must be followed out, because it was regarded as a means of attaining peace and making England submissive.—*N. Y. Herald*, 20/4.

SEIZING NEUTRAL SHIPS PRECEDENT SET BY GERMANY.—Vice Admiral von Capelle's attack on the United States and the Allies before the main Reichstag Committee, for what he called "the robbery of Dutch tonnage," caused State Department officials to call attention to-day to the fact that Prince Bismarck justified the action by Prussian troops in 1870 in seizing and sinking six neutral British vessels in the River Seine near Rouen.

Bismarck, in a note to Count Bernstorff, German Minister to London, under date of January 25, 1871, said:

"The case was one of necessity, which, even in time of peace, may render the employment or destruction of foreign property admissible, under reservation of indemnification. I take the opportunity of calling to mind that a similar right in time of war has become a peculiar institute, the Jus Angariae, which so high an authority as Sir Robert Phillmore defines thus:

"'That a belligerent power demands and makes use of foreign ships, even such as are not in inland waters, but in ports and roadsteads within its jurisdiction and even compels the crews to transport troops, ammunition and implements of warfare.'"

Ship construction in this country has exceeded many fold American losses by submarines since the United States entered the war, Shipping Board officials said to-day in discussing the statement of Von Capelle.

It was emphasized that he made no such claim with respect to American shipping, which has suffered the loss of only three or four vessels since war was declared. Sinkings of American ships were more frequent when the United States was neutral and the ships went unarmed against attack. It was said to-day that no more than 40 merchant ships flying the American flag had been lost from all causes since the war began, nearly four years ago.—*N. Y. Herald*, 20/4.

BELIEVE GERMANY HAS STOCKS OF VANADIUM.—An analysis of fragments of shells flung by the German long-range guns into Paris, showing that the walls of the projectiles contained a considerable quantity of vanadium, has aroused speculation among steelmakers as to the German source of this important alloy. Moderate amounts of the metal are produced in Sweden from ores found there, but it had been supposed that importations from this source had been used by the Germans in building their submarines and other war engines requiring steel of the particular quality obtained by the use of vanadium as an alloy. It is estimated that the American Vanadium Company, through its mines in Peru, supplied more

than three-quarters of the metal which reached the world's markets before the war, and none of this is known to have reached Germany on direct shipments from the time when the allied navies began their rigid search for contraband on Europe-bound vessels.

The theory of steel men is that, in preparing for the war, Germany laid in large stocks of the alloy. In course of a discussion of the shells from the Teuton big gun, Joseph de Wyckoff, foreign sales manager of the American Vanadium Company, recalled that fully a year and a half before the outbreak of hostilities the Krupp management hinted that substantial amounts of vanadium were held in the company's storehouses.

The phase of the situation which interests the steel trade particularly is the ability of the German shellmakers to make use of this precious alloy for a special and not altogether effective purpose after nearly four years of war. Either the accumulated stock was much greater than was believed in 1914, or imports by secret channels have kept the supply abreast of the heavy demand. After the submarine *Deutschland* left this side on her second trip it was rumored that a large consignment of vanadium was aboard, and that in both trips the undersea cargo carrier took back 25,000 pounds of the metal. None of this had its source in the American Vanadium Company's mines, officers of the company state, and presumably was supplied from a store accumulated by German agents here.—*N. Y. Herald*, 3/5.

BOCHES PAVE WAY FOR ATTACK ON AMERICAN HOSPITAL SHIPS.—The German wireless, which recently sent out a despatch alleging that American aviators were crossing to Europe by hospital ships, reiterates the charges in a longer despatch. The reason for the emphasis placed on this false charge by the Germans, it is stated here, is probably that they are laying the foundation for justification at a later date of the torpedoing of the American hospital ships in case any such ships are put in the transatlantic service to carry home invalided soldiers. It may be recalled that similar charges were spread broadcast about British hospital ships, as a prelude to torpedoing them. The German wireless message says:

"American aviators are crossing to Europe as members of the Red Cross on hospital ships. This misuse of the Red Cross appears from documentary evidence found on American aviators who have been shot down. An American brought down in the region of the army of General Von Hutier carried a pass which referred to him as a member of the American Ambulance Service for France.

"Prisoners openly admit that it is the general practice for aviators to enter the American Ambulance Service for their passage to Europe and to cross on hospital ships. After they are landed in France they immediately transfer to the automobile corps and thence into the air service.

"The captured aviator referred to had, however, transferred directly from the ambulance service into the air service. Another carried a certificate in which the dates of several transfers were officially indicated."

[The British Admiralty already has denied the charge that American aviators were crossing on hospital ships, saying: "No hospital ship, British or American, has ever carried anybody but invalids and the necessary medical staff. The American naval authorities state that they have some few aviators who were in the Allied Ambulance Service in France before the United States came into the war, but even in such cases these men crossed the Atlantic in ordinary ships, taking their full chance of being torpedoed."]—*N. Y. Herald*, 3/5.

GREAT BRITAIN

BRITAIN MAY AUCTION HIGH PRICED SHIPS.—The London correspondent of the *Daily Post* says a suggestion of interest to ship owners is being made with regard to standard ships built and registered in the name of the Ship-

ping Controller and ships which have been bought at high prices for the Shipping Controller from other countries, notably the United States and Japan.

The ships eventually will be sold when the government goes out of the ship owning business, and it is suggested the vessels be put up at auction now and pass into the ownership of private firms, being treated exactly in the same way as ships requisitioned for the period of the war, which are used by the government, but remain the property of their original owners.—*N. Y. Herald*, 27/4.

SHIP LOSS REPORT MONTHLY.—*British Decide to Abandon the Weekly Bulletin.*—The Admiralty has announced the cessation of the weekly return of shipping losses and the substitution of a monthly report on the Thursday following the 21st of each month.

A table issued gives the losses of British, allied and neutral tonnage due to enemy action and marine risk since the beginning of 1917. The losses for the quarter ending in March, 1917, were: British, 911,840, and allied and neutral, 1,619,373. For the quarter ending in June: British, 1,361,370, and allied and neutral 2,236,934. For the quarter ending in September: British, 952,938, and allied and neutral, 1,494,473. For the quarter ending in December: British, 782,880, and allied and neutral, 1,272,843.—*Baltimore Sun*, 25/4.

HOLLAND

HOLLAND'S QUARREL WITH GERMANY.—Whether Holland is to be added to the list of nations at war is one of the big questions to-day. If she does come in, there appears to be no doubt that it will be on the side of the Allies. The reasons Germany is putting forth for her aggressive stand against this little country can be boiled down to the Dutch ship situation, now in a great measure controlled by the United States, and her need to use Dutch territory and Dutch waterways for the shipment of munitions and material to build up the intrenchments and embankments in Belgium. The second reason resolves itself into the sand and gravel controversy between Holland and Germany and between Holland and England. This dispute began in 1915, when it first came to the notice of the British Government that Holland was allowing Germany to ship military supplies through her country, thus violating the laws of neutral governments. In October, 1917, the British Government called Holland to task for allowing her waterways to be used by the Germans for the shipment of copper, sand and gravel used in building military posts and roads.

"The German Government have been and are being allowed to transport supplies required in connection with their military operations from their own territory to territory in German occupation, and *vice versa* across the territory of a state taking no part in the war," wrote Mr. Balfour. "The intention and result is materially to relieve the strain upon the railways and waterways of the belligerent country essential to its military operations. What is taking place constitutes a breach of the obligations incumbent upon a neutral state.

"If Germany finds it necessary for her own purposes to send commodities containing copper to Belgium to be smelted in order to extract the metal, and then to return the metal from Belgium to her own territory for use in her munition factories, the carriage of these supplies backward and forward, if permitted, via neutral territory, affords relief to the direct military transport system between Belgium and Germany and constitutes the use by Germany of Netherlands territory for military purposes. For the Netherlands Government to permit this to fail in the observance of their duties as a neutral.

"With regard to sand and gravel, it is immaterial whether the German purposes are alleged to be civil or alleged to be military. Germany is in occupation of Belgium merely in pursuit of military objects, and there can

Germany has all along believed that the Dutch would be too much occupied with feeding the German armies and supplying German armaments to think of opposing by arms their best customer. From the very beginning of the war, however, the press of Holland, as well as the government itself, in a long series of diplomatic exchanges, has taught Germany otherwise.

The war caused a great dislocation of Dutch industries and an extra expense to the government, which up to June, 1917, had averaged $35,000,000 a year.

To several interpellations made in the chamber as to whether the Dutch Army was adequately prepared, the General Headquarters issued a memorandum.

"Though it is inadvisable to make public information which might benefit a possible future enemy, there is no objection to furnishing data which will convince Dutch soldiers that they can face the prospect of war with confidence."

If their country were attacked from Germany, engineers who know Holland and its history, say there is no doubt that the Dutch would open the dykes and flood certain tracks which lie below sea level in order to secure protection of North Holland.

There are two main lines of inundation. The advanced positions toward Germany is known as the Grebbe line, and extends from the Waal, across the Rijn, through Amersfoort to the Zuider Zee.

The other, and by far the more important, line runs from Muiden, on the Zuider Zee, through Utrecht and Kuilenburg, to Gorkum, on the Maas. All this tract of country can be flooded by sections, and when the waters were spread over the face of the land a chain of forts, gristling with guns, would be left sticking out like islands to repel the invaders.

In that case the whole of the North of Holland would be turned into a vast island from the Maas to the forts of the Helder, at the narrow entrance to the Zuider Zee, if necessity arose, great stretches of this island could also be flooded by breaking down the seaward dykes to which Holland owes her very existence. The sacrifice would be great, but the Dutch press has recently been saying: "Liever bedorven dan verloren land"—Better a drowned land than a lost one.—*Baltimore Evening Sun*, 25/4.

DUTCH PRESS SNEERS MAY CAUSE AMERICA TO DROP GRAIN OFFER.—The United States is prepared to withdraw its recent offer of three ships to expedite grain to Holland, if the comment of Dutch newspapers, accusing the United States of duplicity in the condition that equal tonnage should leave Dutch harbors for America, is to be taken as indicative of the feeling of the Netherlands Government and people.

Officials expressed disappointment and surprise at the reception accorded to the offer of the United States, which based on a proposal of the Dutch Government to alleviate suffering from a shortage of breadstuffs. The offer was supplementary to President Wilson's statement of March 20, when the Dutch ships were requisitioned, that 100,000 tons of grain would be provided for Holland if ships were sent to carry it.

If Holland does not desire to take advantage of the offer to expedite the grain, the original offer to furnish grain still holds, but the time consumed in sending ships from Holland to America will delay the relief the United States is ready to grant.

Typical of the Dutch comment is an editorial in the *New Rotterdam Courant*, received by cable, as follows:

"In the last few days an official American communication has been received to the effect that three vessels, over two of which the American Government has no jurisdiction, will be allowed ultimately to leave for Holland on condition of the leaving of vessels of equal tonnage from Holland to an American port. This apparently friendly concession is

really be tightening of the noose, if, as has been suggested, it is an attempt to make Holland purchase three cargoes of grain with three conveyors. This would be a perfidious offer about which disappointment could not be too strongly expressed.

"We have not a high opinion of American good faith, but that official duplicity could go so far on promises made in black and white by the President of the United States, openly repudiated, it is impossible to believe. Such shamelessness has not been exceeded in this war. The American Government must give unambiguous guarantee that the President's promises of March 20 will be respected."

The condition that equal tonnage should leave Dutch waters for America when the grain steamship left was imposed to prevent an increase in the size of the fleet tied up in Dutch ports by the German submarine menace.—*N. Y. Herald*, 25/4.

RUSSIA

MUNITIONS AT KOLA SOUGHT BY GERMANS.—Germany is striving to get a big, fresh store of munitions piled up by the Russians at the port of Kola, according to War Department information. This is behind the offensive raging in Finland, a battle dwarfed by the west-front struggle, but still important from the fact that Germany has been forced to send more troops into Finland.

Three or four divisions have been thrown into Finland in recent days and other reinforcements had to be sent there previously. This is little compared to the numbers on the west front, but at the present stage one fresh division in the west could relieve three or four jaded divisions.

The Finnish map shows a "nutcracker" problem. To the north of Tammerfors are the White Guards, friendly to and aiding Germany. In the south the Germans came in from the Aland Islands, Hango and Lovisa. They now hold Helsingfors and Abo. Between the White Guards and the Germans are the Red Guards, Finnish Bolsheviki. Fighting gallantly, they have staved off the Whites and the Germans thus far, but the "nutcracker" is closing on them.

The War Department's information is that Germany intends to place one of the Kaiser's sons over Finland and that the Teutons intend to sweep across to the railroad which runs from Petrograd to Kola, and all-the-year warm water port, where vast Russian supplies were landed.

British marines recently landed there. They are intended to guard the munitions there just as the Japanese and British are keeping a watchful eye on supplies at Vladivostok, Siberia.

Army men praise the Red Guards' gallant defence and take some comfort from the fact that Germany is forced to send troops to Finland instead of drawing on that locality to reinforce the west front.—*Baltimore Evening Sun*, 19/4.

NO SIBERIAN CAMPAIGN NOW.—Those in Japan who favor Japanese intervention in Siberia found no encouragement in the words of Viscount Yasuya Uchida, former Ambassador at Washington, who, on his return here from his post as Ambassador to Russia, expressed doubt as to the wisdom of entering Siberia at this time. His conviction was that Bolshevism to-day represents the thought of a great majority of the Russian people.

The addresses of Count Terauchi, the Prime Minister, and Viscount Motono, the Foreign Minister, before the Diet recently are interpreted as indicating that Japan will for the present send no army into Siberia. Although nothing has been announced officially, the impression prevails that Japan has been influenced considerably by the attitude of the United States, which was that of doubting the practicability of Japanese intervention.

The Japanese campaign in Russia doubtlessly would depend on assistance from the United States as to war material, including munitions and air-

planes, and perhaps money. It is believed t
begin a war on Russian soil without the supp
that is why armed intervention is considere
Should the situation change for the worse,
special session of the Diet to consider the mat
military preparations are being advanced.—*B*

ONE HUNDRED THOUSAND TEUTONIC CAPTIVE
German and Austrian war prisoners in Siberi
100,000, and in official circles here it is held th
to the allied position in the Far East. W
prisoners bearing arms under the Bolshevik f
number might prove a potent danger if permit
and directing force behind the Bolsheviki.

With German organization controlling the E
be raised in Siberia. It is held here that such
sending of a large Allies army to this theater

Previous to the rise of the Bolsheviki to
peace negotiations with Germany, the Allies
Siberia. Since then little has been done to c
or German attempts to obtain control of the
the war is brought to a close.

The greater number of the 100,000 prison
large towns to the west, but in Priamuria—tha
on Manchuria and which has an outlet to the
15,000 and 16,000. These are in encampmer
schensk, Nicholsk and other centers. The pr
to one in favor of the Austrians. Five th
Priamuria are officers, most of them being in

It is known that in Irkutsk and Western Si
the officers, are working with the Bolsheviki.
are with the Bolshevik forces now fighting a
anti-Bolshevik leader in Eastern Siberia.

Those who have visited the prison camps s
themselves in excellent physical condition, be
their services will be needed in the Far East,
come to their assistance over the Siberian Ra

General Semenoff is holding an important
between Vladivostok and Irkutsk. His forc
supply of arms and ammunition limited. Sl
sheviki work in unity they may break Semen

Allied sympathizers here declare that the on
German prisoners from doing further damag
that would enable the Allies to obtain control
still, to have the prisoners removed to a safe

A large number of escaped prisoners have
and Mongolia by using passports purchased fr
Some of these have been at work among the la
of the Chinese province of Sinkiang, while
Turkish agents have been attempting to bring
government.—*N. Y. Herald,* 26/4.

KORNILOFF TROOPS FIGHT BOLSHEVIKI.—H
between the troops of General Korniloff and
on-Don is in the hands of the anarchists. A
left, massacres of officers and bourgeoisie
Germans since have reoccupied the town.

Criminals at Novo-Tcherkask, who began
dispersed by machine guns. The Turkish cr
pedo-boats are reported to have arrived at
fighting between the White Guards and Re
N. Y. Herald, 22/4.

REFUSE TO FIGHT ALLIES.—The Germans are steadily withdrawing troops and sending them to France.

Polish citizens refused to enlist in a proposed Polish corps to fight against the Allies in Flanders.—*Baltimore Evening Sun*, 26/4.

SWEDEN

ONE HUNDRED AND SEVENTY-SIX SWEDISH SHIPS LOST.—One hundred and seventy-six Swedish ships, with a gross tonnage of 175,000, have been destroyed in the course of the war. For the most part they were sunk by German submarines. One hundred and twenty-one were steamships. Generally the Germans were reluctant to sacrifice costly torpedoes on small prey. The biggest ship loss was the *Fridland*, of 5000 tons. Through the destruction of these ships 224 Swedes were killed and drowned, in addition to other nationalities among the crews.—*N. Y. Herald*, 11/5.

UNITED STATES

SHIPS AUTHORIZED.—Six new authorized United States battleships are designed to be of 41,500 tons, the largest battleships in the world.—*Official Bulletin*, 30/4.

TWO 1000-FOOT DOCKS FOR NORFOLK.—The original plan of the Navy Department for the construction of new docks of the largest capacity called for two such docks at Philadelphia and one at Norfolk. This plan has been changed and one is to be built at Philadelphia and two at Norfolk. According to Rear Admiral McLean, commanding the Fifth Naval District, one of the docks now under construction will be ready next fall. Their length will be such that any ship which can pass through the Panama Canal, where the locks have a limiting length of 1000 feet, can enter either of the two docks which are to be built at Norfolk. This new work is of the most urgent character and it should be rushed to completion with all possible speed.—*Scientific American*, 27/4.

CONCRETE LIGHTERS.—S. W. Stewart, president of the Ambursen Construction Co., 61 Broadway, announced recently that the Navy Department had awarded a contract to his company for the construction of four reinforced concrete fuel oil and coal barges, designed to carry 800 tons, to be used in New York harbor. It is believed that the Navy Department will build 12 of these vessels. One of the chief difficulties in designing these vessels was to make the concrete oil proof. This was met successfully, the company says, and it believes that the method of construction devised will be found suitable for oil tankers in the Gulf and coastwise service.—*N. Y. Herald*, 25/4.

BALTIMORE TO BE BIG NAVAL SHIPPING PORT.—Baltimore is to be made a large base for the shipment of naval supplies, according to information gathered at the City Hall. Representatives of the Navy Department have been in conference with the Board of Estimates over the use of the city wharf at the foot of Hughes Street.

The plan as outlined is to build a warehouse and depot on a lot 20,000 feet square and to utilize other portions of the pier, said to be well adapted to the uses of the government as a shipping center. It was stated that an expert from Washington would be in Baltimore in a few days to make an inspection of the pier and let the city officials know exactly what is wanted.

The Board of Estimates is disposed to let the government have all the water-front space it might need to help win the war, and the Hughes Street wharf will be leased if the navy needs it.—*Baltimore Evening Sun*, 25/4.

DRY DOCK.—Charleston is happy over the decision of the Committee on Naval Affairs of the House of Representatives to have $9,000,000 authorized for the construction of a huge dry dock at the Charleston Navy Yard and the dredging of a 40-foot channel from the yard to the sea. A first appropriation of $1,500,000 for channel work has already been adopted by the House of Representatives as part of the Rivers and Harbors Bill, and the maximum authorization for this work is $5,000,000.

The channel will be 1000 feet wide from the navy yard to the sea, which will take in a very large part of the Cooper River, and will be 40 feet at low water, thus making Charleston one of the few very deep ports of the world. The dock is to cost $4,000,000 and will be capable of handling any vessel that can pass through the Panama Canal. The dock appropriation is in the new naval bill.—*N. Y. Herald*, 10/5.

AVIATION IN THE NAVY.—In the course of the discussion on the naval appropriation bill in the House of Representatives on April 19, much information was divulged as to the condition of aviation in the navy, the establishment of bases, progress in the manufacture of flying machines, and the merits of the Liberty Motor. In fact, after the discussion of the item of $188,042,969 had gone on to the point of exhausting nearly all the secrets of our aviation program, Mr. Butler called the House to attention by asking the question: "Does not the chairman think that we have now told the Hun all we know about the motors and that we have not flying machines?" This query brought the discussion to an abrupt end.

Among the facts revealed in public for the first time were that the U. S. Navy had aviation bases in operation in Ireland and Scotland as well as in England and France. The largest airplanes we are constructing now cost $42,000 each, $30,000 for the machine and $6000 each for the two engines. Mr. Padgett explained that much of the delay in the carrying out of our aviation program was due to the inability of the industry in America to live up to its promises although they were now making an improvement in respect to deliveries. He also quoted Chief Constructor David W. Taylor, U. S. N., as stating that the navy was up to its promises and expectations with training machines, but that they were about 60 days behind on the combat or fighting machines, and they were making good progress toward getting up to their expectations.

Mr. Husted said he had found that in the army they are turning out flying students at the ground schools much faster than they were able to provide them with planes in which to learn to fly, and his inquiry brought out the statement that the same condition existed in the navy. Mr. Padgett, however, quoted Colonel Deeds as stating that there is not an aviator abroad who has not machines with which to fly, and that there will not be one abroad that will not have machines when he needs them. These would be foreign machines, he explained, but he made the point that the men who would have the planes they needed now and that we had begun to ship machines abroad to provide for the future. Chief Constructor Taylor stated to Mr. Padgett that the manufacturers would be turning out the big 92-foot machines at the rate of two a day "as soon as they got their plans developed."

In response to a question, Mr. Oliver stated that all the navy airplane stations were now provided with training planes and that they are fairly well equipped with service planes for advanced training. At all our foreign stations we have a sufficient number of pilots, mechanics, and other trained officers to carry on the work at present. All these planes, however, had been obtained from France. He added that the navy was now prepared to ship at least 20 service planes abroad and that "shipments will steadily increase, so Captain Morrill has informed me." Mr. Oliver stated that "we had something like 320 officers and men in the aviation service when war was declared; we have now more than 17,000."

Mr. Britten declared that "aviation in the navy to-day is almost a complete failure," after stating that on April 1, 1917, the navy had 93 completed seaplanes with 133 under construction. On January 1 of this year the navy had 324 completed planes all told, many of which were obsolete, this being an increase of about 100 in nine months of war. "If that is making real progress," he declared, "I do not know the meaning of the word."

Mr. Farr pointed out, as a defence of the Liberty Motor, that Germany had maintained her strength in the air largely through one machine, the Mercedes; that she has made no changes in that machine but by tactical experience and ability has utilized it to great advantage.—*Army and Navy Journal*, 27/4.

FORD SHIPYARD FOR "EAGLE" CLASS BOATS.—Where was a swale there stands what is said to be by engineers the largest building in this country, which might as well include the entire world without fear of refutation. It is 300 feet wide and 1700 feet long, of steel and glass construction. In it will be housed at one time a score of the craft that are to be turned out in wholesale quantities for the government. And it is only one of a group, the rest of which are almost as imposing.

Where once Roulo creek twisted and turned and back-tracked across the fields, there are heavy concrete bases that will support transfer tracks leading to the launching slip.

When you ask what became of the creek, they point off across the field toward Maple road, and in the most matter-of-fact way tell you that they put it over there. Such a trifling matter as sending a creek that in many sections would be counted a river down through a specially constructed channel, with concrete retaining walls, and appropriating the course it had run for generations for other purposes, doesn't particularly interest the engineers in charge of this job, because to them it is a minor item.

The same fine disregard for natural obstacles is displayed all along the line. Whoever heard of putting a shipbuilding plant inland and bringing water to it? Yet that is exactly what is being done here.

The plant is commonly spoken of as being on the Rouge River.

The building where the boats are to be assembled is fully a half mile from the Rouge at its nearest point. The launching basin adjoins this building, so a channel wide and deep enough to accommodate a good-sized freighter is being excavated, or, perhaps, sloughed would be a better term to employ, because of the manner in which it is being done.

Usually on such a job a number of dredges would be put at work digging the channel, and the dirt taken out would be loaded on scows and towed away, or it would be piled up on the bank, a barrier to further progress in that direction. Not so here, where saving of time is the big consideration.

Outwardly the huge hulk that is eating its way through the fields with almost incredible rapidity resembles, to the layman, an ordinary dredge. However, it differs very materially, for instead of a big shovel coming up with its slimy load a giant agitator revolving at any desired depth in the water moves from one side to the other of the channel, working the soil loose and mixing it with the water. It is then drawn into a flexible pipe line, and by means of air is pumped for a quarter of a mile on to low ground, where the dirt can be used for filling, the water draining off naturally. Thus, with a single operation, two purposes are served, and the excavator eats its way into the bank with a speed that discounts the old system, having a capacity of 500 yards per hour.

The water in this channel will average 12 feet in depth, and there are portions of the course where as much more dirt must be sloughed off above the water-line, so that aside from the unique manner in which the task is being accomplished it is an undertaking of magnitude.

Originality crops out on every side, and everything is planned with a view to expediting the assembling of the boats which are so sorely needed

right now, and which, it is predicted, will be in commission before summer is at hand.

There will be no duplication of effort, no unnecessary handling of material, with the attendant expense and loss of time. The raw stock is to be taken into the fabricating plant of itself 150 feet wide and 450 feet long, on one side, cut and shaped and sent out on the other side to the assembling building. Here there will be three shipways, each capable of accommodating seven of the craft at one time, with a serving track between each of the shipways, from which material can be delivered to the workers as needed.

Each boat is to be mounted on special trucks running on tracks laid lengthwise of the building. Several groups of operations are required in assembling a boat, and as fast as one is completed the craft will be moved along to the next band of workmen, until eventually it emerges at the far end complete.

Instead of breaking a be-ribboned bottle of grape juice over the bow of the vessel as it slides off the ways, in conformity with time-honored tradition, it will be taken in hand by a hydraulic lift and deposited in the water, ready for the machinery and the finishing touches that will be given a little farther down the slip.

And by the time the boat is in position for the machinery the truck that carried it will be back at the end of the line ready to start the trip all over again.

It is an adaptation of the conveyor assembling system which has been developed so thoroughly in the putting together of cars at the Ford Motor Company's factory, and it is predicted that, making due allowance for the difference in size, the boats will be coming through with the same proportionate speed when this plant is in full running order.

As for the boats themselves—*Eagles* they will be officially christened—little can be said at this time, because publishing the details could easily be construed as treasonable on the ground that it was furnishing aid to the enemy; although by no stretch of the official imagination could such action be regarded as giving comfort to him. Indeed, the best naval constructors in this country, and some of the brightest minds abroad, who have had a hand in fashioning the craft, or who have been permitted to go over the plans and see the working model, are unanimous in asserting that once afloat these chasers will be anything but a comfort to the Kaiser and his cohorts.

Built for Business.—From stem to stern, from keelplate to the top of the radio staff, every bit of the craft will be steel, wood being entirely eliminated. The *Eagles* are not being built for display. They will be required to undergo the hardest sort of usage, and, while everything is complete, it is evident that business first was uppermost in the minds of the designers. The hull is divided by water-tight compartments that render it practically unsinkable.

The prow is knife-like, and it is reinforced in a manner that is most deceiving to the casual observer, for the boat will be able to deliver a terrific blow to an enemy craft without suffering any damage. It is intended for hit and run purposes, and its mechanical equipment is such that it can be handled almost as easily as one of the automobiles that have made their maker famous.

When it comes to mixing things with the enemy, the *Eagle* has little to fear. In the first place, it is of exceptionally light draft. Then the hull is of such a type that should a torpedo find it, the missile would probably glance off before it did any harm.

Here is an interesting thing in connection with these sub-chasers—every step is interesting, for that matter, but the procedure here was so unusual as to single it out for distinction.

The first *Eagle* was built miles from any body of water, which of itself upsets every precedent. The plans had hardly been received from the Navy

Department in Washington—and they were little more than a couple of drawings—when the best engineers and draftsmen in the Ford organization were put to work. None of them had ever helped build a ship, but that made no difference. Bit by bit they figured out a model on paper, and before the last drawings were complete the ribs of the hull were in place, and the plates were being put on the sides.

One of the big factory buildings served as "dry dock." Here, far from its native element, the boat was assembled complete, even to the radio outfit. It was a new undertaking, but so carefully had it been planned that no material changes were found necessary.

With the first boat completed, the company was in possession of a set of perfect patterns from which others could be fashioned in any desired number. Talk about standardization! You could take a whole fleet of these boats, jumble the parts together, sort out what was needed, without any reference to "serial numbers," and each unit would fit into place as though made especially for that particular craft. That is a long step in the direction of quantity production that seasoned shipbuilders seem to have ignored up to the present.

Then the Ford company proceeded to give another demonstration of how speed can be attained. It might have decided to install special machinery to handle the material that is to go into these chasers. With good luck, production could possibly have been begun within a year and one-half. But the boats are needed now—therefore, make them now. The very machinery that had been used in producing automobiles was turned over to the shipbuilding department. The production of motor cars was cut down one-third, in conformity with the government plan, and it will be reduced still farther if found advisable.

Presses and shapers and other machines needed in the work were shifted from the parent plant to the shipyard on the west side, and while this was being done parts were fabricated at the main factory and sent across town by rail so that no time would be lost.

These engines are being built at the plant of the Ford Motor Company, and will be laid down ready for installation in the hulls on the 1000-foot docks at the outfitting station.

To an outsider the transformation which has been wrought suggests that the day of miracles has not passed entirely. The men who are engaged in the work take an entirely different and more practical view of it.

"When you have one of the greatest organizations in the world back of you, with Mr. Ford for boss, and his money to spend to the limit, so long as you produce results, you can do almost anything," said "Bill" Knudsen, as we hiked along a well-rolled cinder roadway where a few days before had been a sinkhole into which carloads of brickbats had been dumped before any bottom could be formed. "Of course, the plant has gone up in a hurry, and it looks now as though we would make our schedule, which was a stiff one. But everybody has pulled together fine. And why shouldn't they? The fellows over in the trenches are working a heap harder than we do, no matter how we speed up."

As for Henry Ford, the presiding genius who is putting millions into a plant that may or may not be available for other purposes after the war is over, he only smiles when the matter of such a tremendous investment is mentioned.

"If these boats will hasten the end of the frightful carnage abroad and bring peace that is lasting, there will be no occasion to worry about the money spent," he remarked in discussing the project. "We are in this thing to a finish and we've all got to work and give until it hurts—and then work and give a lot more, because while we did not make it, it is your war and my war, and we must see it through to a successful conclusion."—*Detroit Free Press*, 28/4.

POLICY

INTER-ALLIED NAVAL COUNCIL IN SESSION.—The Inter-Allied Naval Council met recently at the Ministry of Marine, with Georges Leygues, French Minister of Marine, presiding.

Vice Admiral Sims, Captain Twining and Commander Babcock represented the United States, Rear Admiral Hope and seven other officers were present for Great Britain; Vice Admiral Thon di Revel and four other officers for Italy, and Rear Admiral and Captain Hamane for Japan.—*N. Y. Herald*, 27/4.

LACK OF AMERICAN DRY DOCKS.—Lack of dry docks in America constitutes almost as serious a menace as the submarine itself, according to a report issued by the War Shipping Committee of the Philadelphia Chamber of Commerce, in which vigorous appeal is made for additional dry dock facilities at the port of Philadelphia. The committee recommends to the United States Shipping Board that at least four dry docks of 350 feet or more in length be located at this port and that nothing should be left undone to have the construction of these docks completed at the earliest possible date. The report draws attention to the fact that 35 per cent of the ship construction program is to be carried out in the yards of the Delaware River district. At the present time there is but one private dock here, which, under normal conditions, is greatly overcrowded. With the tremendous increase in shipping facilities, the American nation is confronted by a serious scarcity of dry-docking facilities, the report continues. It is pointed out that in Great Britain, which has been pre-eminently a shipping nation, the number of commercial docks exceeding 350 feet in length in 1915 was 171, according to Lloyd's Register. In America to-day there are but 27 dry docks. On the Great Lakes, where the demand for water-borne transportation has contributed to the developing of shipping to the extent of 2,300,000 tons, there were in 1915 20 docks of 350 feet or more in length. On the basis of this proportion the report states that the United States will require 182 docks for our future mercantile fleet.

The amount of attention which will be required by the wooden ships as well as by the fabricated steel ships impresses the members of the War Shipping Committee of the Chamber as being a most important consideration. Engine-driven wooden ships engaged in transatlantic service would necessarily be subject to great strain and stress and could only be maintained in water-tight condition by constant recourse to dry-dock overhauling. Emphasis is laid on the fact also that vessels torpedoed near the Atlantic coast might be saved if they could be worked back to our ports and repaired promptly. Scarcity of dry docks on the Atlantic seaboard at the present time would render abortive any attempt to repair vessels in this condition, the report declares. From the shipping side of the question the report brings forward another point of view which is that the port of New York is overcrowded, and as it does not compare with Philadelphia as a point of origin for foreign shipments, there is only one reason why preference can be given it. That reason is that New York has nine dry docks of more than 350 feet in length. This compels vessels requiring dry dock attention to call at the port of New York. Recently a vessel for which a cargo was awaiting in Philadelphia was compelled to leave that port and go to New York for certain necessary repairs; naturally it never came back, taking a cargo on at New York.

In the report, the opinion of the Department of Wharves, Docks and Ferries of the city is cited to the effect that unless dry docks are built in Philadelphia promptly the advantages of this port with its fresh water, nearness to industries, distance from the sea sufficient to make it immune from attack and at the same time sufficiently near to be easy of access, will all be wasted. The report of the committee has been transmitted to the United States Shipping Board, to Rear Admiral Bowles, to Mayor Smith and to other officials interested in the development of the port of Philadelphia.—*Shipping*, 27/4.

MATERIAL

$200,000,000 ADDED TO BIG NAVAL BILL.—Additional appropriations of about $200,000,000 have been added by the Senate Naval Affairs Sub-Committee to the naval appropriation bill, which carried appropriations of $1,358,000,000, as it passed the House. Of the increases, about $120,000,000 are for naval ordnance.

The sub-committee recommended an increase of the $24,194,000 appropriation for ordnance and ordnance stores by $6,328,000; addition of $45,537,000 to the House appropriation of $48,309,000 for new batteries for ships; increase of $34,530,000 to the $39,259,000 for ammunition for vessels; increase for torpedoes and appliances from $1,000,000 to $11,000,000 and an addition of $13,000,000 to the $5,000,000 for reserve ordnance supplies.

The sub-committee also inserted new amendments providing $3,000,000 for a navy mine depot and $9,150,000 for a navy nitrate plant.—*N. Y. Herald*, 10/5.

FUEL OIL SHORTAGE SHOWN.—Opening of oil lands set aside as naval reserves, in order that the increasing shortage of fuel oil on the Pacific coast may be relieved, has been urged upon Secretary Daniels by representatives of oil companies and others. No decision has been reached, Secretary Daniels said.

The attitude of the department has not been changed since Mr. Daniels expressed his approval of the operation of naval oil reserves under federal supervision and the utilization of some part of the production for the relief of the situation on the Pacific coast.

The representatives of the oil interests told the Secretary they were perfectly willing to place their interests in the naval reserve lands in the hands of the President for settlement.—*Evening Star*, 7/5.

NAVY EMERGENCY RATION.—The newly adopted emergency ration for the navy will consist of 8 ounces of bread component (cooked wheat ground to a powder), 5 ounces of meat component (fresh lean beef reduced to a powder), and 1 ounce of common salt, all thoroughly mixed and compressed into tablets, four to a package. The chocolate component will be formed into cakes of 1½ ounces each. Three packages of tablets and three cakes of chocolate will be inclosed in a round tin bearing the following directions: "Calculated to subsist one man one day. Bread and meat component to be eaten dry or stirred into cold water; or one package may be boiled five minutes or longer in three pints of water and resulting soup seasoned to taste; or one package may be boiled in one pint of water for five minutes, making a thick porridge to be eaten hot or cold; when cold may be sliced and fried if bacon or other fat is available. Chocolate component may be eaten dry or made into liquid by placing the chocolate in a cup held in hot water. After melting add boiling water slowly, stirring constantly, until desired consistency is obtained." This ration is criticised by some of the food experts as containing too much salt and as otherwise calculated to produce undue thirst. The meat component is not regarded as essential by some of the authorities, who prefer only whole wheat bread with, if desired, bacon or sardines. In fact, the ideal emergency ration for naval use is said to be canned beans, sardines, and brown bread, as palatable and nutritious and as containing the necessary percentage of water. The difficulty of such a ration, however, is in keeping it intact for use in an emergency, as it is apt to be surreptitiously drawn upon as an attractive edible which the adopted ration is not under ordinary circumstances. This is on the theory that the navy is not likely to need to subsist on an emergency ration for very long at a time, and men who survive a disaster at sea could live for several days before being rescued, without any food at all, provided they had sufficient drinking water.—*Army and Navy Register*, 11/5.

DUTCH EMBARGO HURTS.—*America Must Seek Other Sources of Tin, Quinine and Other Things.*—Holland has placed an embargo on the exportation from the Dutch East Indies of tin, tin ore, cinchona bark, quinine, quinine salts and kapok, all of which are needed in large quantities by the United States for war purposes.

Official notification of the embargo, effective April 22, was received April 26 and caused much perturbation. Officials declined to indicate the probable reasons, but in some quarters it was suggested the measure was in retaliation for the American requisitioning of Dutch ships. Elsewhere it was thought to have been prompted by the critical situation in which Holland finds herself with Germany.

The embargo on tin and tin ore will prove especially embarrassing to the United States. Supplies needed for munitions and food preservation were expected to come from the Dutch East Indies, as the British are taking the entire output of the Straits Settlements. About 16,000 tons of tin was bought by the United States last year from the Dutch East Indies, and the amount probably would have been increased this year.

Cinchona bark, quinine and quinine salts are needed for medicinal purposes by the army. Kapok is a vegetable product, used in making hammock mattresses for the navy.

The United States is almost completely dependent for tin on the outside world. It is probable that Bolivia now will be looked to for a supply.—*Baltimore Sun*, 27/4.

PERSONNEL

NAVAL BILL CHANGES.—Some important changes are to be recommended by the Senate Naval Committee in the naval appropriation bill, which has been under consideration by the committee for some days, during which time representatives of the Navy Department were heard in explanation of the needs of the naval service. As the bill passed the House, the bill authorized increase in the enlisted strength to 228,000 men, all of which above the present authorized permanent strength of 93,000 was to be temporary for the period of the war. The Senate Committee has decided to recommend an increase of the permanent strength to 131,645 men, with an additional allowance of temporary strength to bring the total of both classes to 228,000, as carried by the House bill. The permanent allowance approved by the Senate Committee is the minimum number required to man the vessels of the navy of a permanent character now in commission and that will be placed in service up to July 1, 1919, and it does not provide for recruits under training, aviation personnel, etc., which will have to be carried in the temporary allowance. Notwithstanding the showing of the departmental officials of the need for increasing the permanent allowance of enlisted men, in order to provide personnel for new ships as they are ready for service, Secretary Daniels indicated his opposition to such increase, and would only approve increase of temporary character. This is one of the reasons that only temporary increase was authorized by the House bill. Certain members of the Senate Committee appreciated the need for an increase of the permanent allowance, and when this was brought to the attention of Mr. Daniels he consented to approve only so much as is absolutely needed for new ships that are expected to be ready for service between now and July 1, 1919, and he would not approve any additional permanent allowance for recruits under training, the air service, etc.—*Army and Navy Register*, 11/5.

READJUSTMENT OF NAVAL PERSONNEL.—Data is being prepared in the Navy Department showing reasons why the law should be amended by removing the limitation against the temporary promotion of officers, on the basis of the temporary personnel, beyond the grade of lieutenant commander. This data will be submitted to the Senate Naval Committee in an effort to have the pending naval appropriation bill amended to provide

temporary officers in the higher grades on the same ratio as allowed for the permanent commissioned personnel. The act of August 29, 1916, provides that the total number of commissioned officers of the active list of the line of the navy, exclusive of commissioned warrant officers, shall be 4 per cent of the total authorized enlisted strength of the active list, exclusive of the hospital corps, prisoners undergoing sentence of discharge, enlisted men detailed for duty with the naval militia, and the flying corps. The act also provides that the commissioned line officers of the active list shall be distributed in proportion to one of the grade of rear admiral to four in the grade of captain, to seven in the grade of commander, to fourteen in the grade of lieutenant commander, to thirty-two and one-half in the grade of lieutenant, to forty-one and one-half in the grades of lieutenant (junior grade) and ensign. It is desired to have the commissioned personnel of the line based on the temporary authorized enlisted strength distributed in the same proportion, instead of being limited to the grades of lieutenant commander and below as at present. It will be shown to the committee that already there is need of a greater number of flag officers for duty afloat than are available with the present number of officers in that grade, and the need will increase as the war goes on. In fact, at present about 50 per cent more flag officers, captains and commanders are needed than are in those grades.—*Army and Navy Register*, 4/5.

RANK AND PRECEDENCE IN NAVY.—The Secretary of the Navy proposes the enactment of a law providing that officers of the line and staff of the navy, who have been or may hereafter be permanently appointed in the same grades and ranks in accordance with the act of May 22, 1917, shall take rank and precedence over temporary appointees. In submitting this matter to Congress, Mr. Daniels says:

"As the law now stands with relation to rank and precedence of officers, those appointed for temporary service under the act of May 22, 1917, take rank with permanent officers of the navy of the same rank and grade according to the dates of their commissions, an officer of an earlier date of commission taking precedence over an officer of a later date in the same rank or grade. As a consequence, officers newly appointed in the lowest grade, who have had little or no training to fit them for the duties of their office, take rank and precedence over graduates of the Naval Academy who may be permanently appointed only a few days later after the completion of a course of three or four years of intensive training. The benefits of the proposed legislation will extend further. Some officers of the permanent navy who have been temporarily advanced under the act of May 22, 1917, to the grades of rear admiral, captain and commander will be selected to fill permanent places in these grades. Although they may be selected by the board for permanent promotion over other officers who hold temporary appointments in the same grade, yet under existing laws they will not gain seniority over such officers until the termination of all temporary appointments under the act of May 22, 1917, at which time permanent officers holding temporary commissions in higher grades will revert to the places from which they were advanced, or to the places to which they are entitled to be promoted under the act of August 29, 1916. I believe it is not to the best interest of the service that temporary officers should take rank and precedence ahead of permanent officers of the same rank and grade by reason of earlier date of commission alone. Favorable consideration of the inclosed draft of a bill is, therefore, recommended, with the request that it be enacted as a separate bill or be inserted as a provision of some pending legislation relating to the personnel of the navy."—*Army and Navy Register*, 4/5.

MIDSHIPMEN.—While the result has not been definitely announced, it is believed that the class entering the Naval Academy in June will number

not less than 1000. The largest class heretofore was 750. Authority has been included in the naval appropriation bill for the construction of a new auditorium at Annapolis. Hereafter, candidates for the Naval Academy must be between the ages of 16 and 20 years on April 1 of the year admitted, as noted on our Congress page.—*Army and Navy Journal*, 11/5.

WILL ENLARGE MARINE CORPS.—*House Votes to Make Strength 75,500.*—Increase of the Marine Corps' strength to 75,500 was voted by the House to-day to enable the navy to put an entire division of the sea soldiers at the front with Pershing's Expeditionary Forces. Provisions for the increase, which would add about 50 per cent to the enlisted personnel, was approved by the Naval Committee, and promptly was made a part of the naval appropriation bill under consideration in the House.

The action was based on a recommendation from General Pershing that the brigade of marines now attached to his forces be raised to a complete division. With 75,000 men the Navy Department not only could maintain a division of 27,000 men in France, but would be able to organize certain advance base forces that have been planned for some time.

It was learned to-day that in conformity with his promise that the marines would be moved up to the front at the earliest possible opportunity, General Pershing recently has relieved them of the guard and transportation duties upon which they have been engaged since they landed in France.

A proposal by Representative Padgett, chairman of the Naval Committee, to create three additional major generals in the Marine Corps was withdrawn temporarily during to-day's debate in the House. With an appropriation of $25,000,000 to take care of the additional number of marines, the bill carries a total of $1,352,608,673. House leaders predicted its passage to-morrow.—*Baltimore Sun*, 20/4.

SELECTION PROMOTION FOR MARINES.—Marine Corps consideration has been given at the headquarters of the corps to the method of making the advancements, of which there will be many as a result of pending legislation. It has been decided that selections for promotion to the grades of colonel, lieutenant colonel and major shall be made by a board of about seven officers from among the brigadier generals and senior colonels of the corps. Owing to the fact that the grades of first and second lieutenants are filled now by those that have been serving a comparatively short time as commissioned officers, and not enough opportunity has been had to determine comparative fitness, promotions to the grades of captain and first lieutenant will continue by seniority in the regular corps. Unless the naval appropriation bill as reported to the House is changed in that respect, practically all of the promotions will be of temporary character, the only exceptions being in the case of those on account of casualties in the permanent personnel and in the case of those resulting from the appointment of one colonel as permanent brigadier general to fill the vacancy caused by advancement of a brigadier general to fill the single place in the grade of major general proposed by the bill. Of course, however, in view of the prospects that there will be an increase allowed much greater than the 20,000 originally proposed, it is likely that a greater number of general officers and the colonels and lieutenant colonels than now carried by the bill will be authorized, the bill as reported to the House carrying, in addition to the permanent major general, three brigadier generals, twelve colonels and twelve lieutenant colonels as an additional temporary allowance.—*Army and Navy Register*, 20/4.

RESERVE AND MILITIA

AMENDMENT OF NAVAL RESERVE LAWS.—Important changes in the naval reserve organization are contained in the naval appropriation bill now

before Congress. The old naval militia and the national naval volunteers will cease to exist, and the members of the latter organization are automatically transferred into Class 2 of the Naval Reserve force, known as the "Naval Reserve," for general service, and confirmed in the rank, grade and rating they now hold in the national naval volunteers, without examination. The Fleet Naval Reserve and the Naval Reserve will become practically identical, both classes being composed exclusively of officers and men who are fully qualified for service in their rank or rating on board of combatant ships. The medical and dental reserve corps will cease to exist, and members of those organizations will be enrolled in the Naval Reserve force in their present grades and ranks.—*Army and Navy Register, 27/4.*

U. S. MERCHANT MARINE

WHAT THE SHIPPING BOARD HAS DONE.[1]—By Edward N. Hurley, Chairman of the Shipping Board.—If by the exercise of magic a bridge could be thrown across the Atlantic over which our armies, their artillery and supply trains could move rapidly and unhampered to the battle lines in France, would any military man in Berlin, Vienna, Rome, Paris, London or Washington have any doubt but that the world would be made safe for democracy before the year goes out? We have the men, we have the guns, we have the supplies. But without means of getting them to the front we might as well be without them. And unless we get our men to the battle line we will not win this war.

So it all comes back to ocean transportation—to the vital need of ships. Fail there and we fail utterly. Upon the Shipping Board has devolved the responsibility of supplying this need, and supplying it under the most extraordinary conditions that ever existed—supplying it at the most crucial period of the war's history, at a time when every other industry is being taxed to its utmost capacity in the matter of materials and labor to provide war necessities.

The handicaps have been many. We were not a maritime nation. Our flag had almost vanished from the seas, and with the exception of a few widely scattered shipyards, merchant marine construction had almost become a lost art with us. Then came this sudden call to outdo the rest of the world in the upbuilding of a merchant marine; a call coming at a moment when the navy was undergoing the greatest expansion in its history—when most, if not all, of the established yards were feverishly engaged in rush construction on dreadnaughts, destroyers, submarines, fuel ships, tenders and other auxiliary craft, and when munition makers were absorbing that part of skilled labor which had not been called to government navy yards or private shipbuilding plants. So it was a case of not only working from the ground up, but of first securing the ground upon which to make a start, some of it, marsh land, which had to be filled in before launching ways could be laid.

When we took hold of this job of shipbuilding we found there was no shipyard in existence with which we could place an order. The old yards, with their trained force of shipbuilders, were filled to capacity. Seventy per cent of their space was taken by the enlarged naval program. The remainder of the space was taken by the orders which had been placed by American owners, and by foreign owners, who, pressed for more ships, had filled the yards of America to overflowing.

We were faced with the necessity of creating an entirely new industry. We had to establish the yards first, get the shipbuilders to take charge of them, and train the men to build the ships. There were 37 steel shipyards in America at the time of our entrance into war. We have located 81 addi-

[1] From an address before the National Marine League New York, March 26.

tional steel and wood yards, while 18 other yards have been expanded. We are building in the new and expanded steel yards 235 new steel shipways, or 26 more than at present exist in all of the steel shipyards of England. The new industry we have created will make America the greatest maritime nation in the history of the world.

Struggling against something that cannot be avoided is more baffling than struggling against something that can be. You can appeal to striking men to go back to work, but you can make no appeal against zero weather. We did what we could. We told the new shipyards to go ahead and use dynamite in locating their pilings. The men in those yards fought the bitter winter. They had the same spirit, and demonstrated the same pluck and unselfishness as the men in the trenches. And they have virtually completed the job of building America's new shipyards—the new yards that will make us the greatest shipbuilding nation.

It has been an uphill struggle, but we have had our moments of elation when we have felt that we are making progress. The record made by the Skinner and Eddy Company of Seattle is a case in point. That company laid the keel for an 8800-ton vessel, which was launched in 64 days. She was delivered to the Fleet Corporation on January 5 and started on the first voyage on January 14. This record accomplishment shows what can be done in live, wide-awake efficient American shipyards.

Then a few days ago we received a telegram from the Moore Shipbuilding Company of Oakland, Cal., announcing the successful launching of one of their large vessels. Twenty minutes later we received another telegram from the same company announcing the launching of a second ship of the same type, and 40 minutes afterward a third telegram saying that a third vessel of similar character had gone overboard. This was the record of one American shipyard. The launching of three 9400-ton vessels in a single afternoon—an accomplishment which I believe is unrivaled in the world's annals of shipbuilding.

The total amount of our steel construction on March 1 was 8,205,708 dead-weight tons. This is made up of 5,160,300 dead-weight tons under contract with the Emergency Fleet Corporation, and 3,045,408 dead-weight tons of requisition vessels.

Of this total steel construction, 2,121,568 dead-weight tons, or approximately 28 per cent, has been completed. That means that in addition to the building of our big new yards we have also been building ships. That is, the program for steel ships has advanced 28 per cent toward completion. Of the amount of steel ships under contract and under requisition, 655,456 dead-weight tons, or approximately 8 per cent, were actually completed and in service on March 1 of this year, nearly a month ago. This amount of floating tonnage exceeds our total output in 1916, including steel, wooden and sailing vessels, by approximately 50 per cent.

Notwithstanding the difficulties of organization, the handicaps of bad weather conditions, transportation embargoes and railroad congestion, nearly as much tonnage has been constructed in American waters in the past three months as by all the other maritime nations of the world combined.

We have had to build up a tremendous administrative organization, with expert naval architects, expert traffic and operating heads, and at a time when the demand for such talent greatly exceeded the supply. We have had to negotiate for neutral tonnage. We have had to requisition and provide for the operation of the entire existing American merchant marine; we have had also to provide skilled supervision for the repairs of interned German ships which were seized.

The Germans thought that by crippling their own vessels in American waters they would be able to prevent us from using them. American ingenuity and resourcefulness gave the answer by restoring these vessels to efficiency. With the expediture of a little less than $8,000,000 (£1,650,000) we have succeeded in placing in our war service and in the service of the

Allies 112 first-class German and Austrian vessels representing a carrying capacity of nearly 800,000 dead-weight tons.

At the outset the 37 old steel yards began increasing their capacity until they now have 195 ways as against 162 eight months ago. Other parts of their plants have increased proportionately. We then made provision for additional new steel yards, some of which have been given financial assistance by the Emergency Fleet Corporation. Thirty additional new steel shipyards are thus being erected, with a total of 203 shipbuilding ways. Thus we now have in the aggregate 67 steel shipyards either wholly or partly engaged in Fleet Corporation work. These yards will have a total of 398 steel building ways. Of these, 35 yards with 258 ways, are on the Atlantic and Gulf coast; 19 yards with 6 ways are on the Pacific, while 13 yards with 74 ways are on the Great Lakes.

Our program for building wooden ships has been beset with many difficulties and handicaps which could not well be foreseen. A year ago, wooden shipbuilding in the United States was almost a lost art. We found 24 old wooden shipyards, with 73 ship ways. The capacity for wooden shipbuilding has been increased until we now have 81 wooden shipbuilding yards, with 332 ways completed or nearing completion.

Assuming that these ways will each produce two standard ships per year, we should turn out about 2,300,000 dead-weight tons of wooden ships annually. These 332 wooden shipbuilding ways, now nearing completion, added to our 398 steel building ways, will give us a total of 730 berths upon which to build steel and wooden vessels. When you consider that we had only 162 steel building ways a few months ago and 73 wooden shipbuilding ways—a total of 235—an increase is shown of 495 wooden and steel berths on which we can build ships.

With our total of 730 wood and steel ways, we will have 521 more berths than Sir Eric Geddes in his recent speech stated England has at the present time.

From the transportation standpoint, we must expect absolute freedom in the movement of our materials; otherwise the speeding up of manufacture is wasted, and consequent delays in finished ships will result. We look to the Railroad Administration with full confidence that they will supply our needs in this respect.

The situation giving us the most concern is the completion of turbines and engines. The very rapid expansion of the shipbuilding program caught the turbine and engine manufacturers totally unprepared. Special tools of all kinds were required for the engine builders' shops, and these tools had to be secured from manufacturing shops already overcrowded with war orders. In addition to this, the severe weather and the transportation tie-up seriously delayed the construction of some of our largest turbine building plants. We anticipated delay during the earlier months for lack of the turbines and engines, but expect to make up for the early shortage.

The proposal to build ships of concrete was first regarded as a fascinating absurdity. On March 14 there was launched from the yards of the San Francisco Company the first concrete steamship, a vessel which the builders christened *Faith*. We hope she will exemplify her name.

Now as to labor—our strong right arm! There has been much talk of conscripting labor, of forcing it into shipyards as our soldiers have been brought into the camps. I wish to put myself on record as being opposed to the conscription of labor. I do not believe conscription necessary, for I believe labor itself will produce conditions which will render idle all thought of conscripting workmen. The vast majority of our workmen are men of intelligence, and when they come to a full realization of the fact that any defection on their part now will not only imperil the nation, but will injure their fellow-workers in almost every field of industrial activity, I feel sure they will respond to all demands made upon them. Unless they fully do their part, their brothers will suffer.

It would be useless to manufacture material and supplies and pile up the products on the wharves if there are no ships to transport them. So, unless our ship workers do their best, other industries must slow down or halt completely, with the result that thousands of workers throughout the country will suffer for lack of employment.

I believe that labor has begun to realize that fact, but I want to drive it home to them; for there are some, I regret to say, who do not yet sense their responsibility. There are many who are not working to their full capacity. There are many who, because of the high wages they are earning, are prone to take too many holidays. Labor generally throughout our shipyards is to-day receiving the highest rate of wages ever paid for similar work in the history of the world. The additional cost of our ships, due to increased wages in shipyards covering the program we have mapped out, will be in excess of $300,000,000 (£61,500,000). We expect, and we have a right to expect the country has a right to expect, that labor will render for this increase of wages a corresponding increase in production—that is the output of ships.

There have been inefficient shipyard owners, as well as inefficient workmen. Where there is an inefficient owner, who does not understand the viewpoint of labor and who thinks only of his profits, labor has a right to complain. We intend to know what the costs and the profits are in every yard. We feel that the public is entitled to this information.

We have felt that it was our duty to see to it that the problem of housing the workmen in these vast new plants we have been creating was solved with care. The cost-plus system has been banned by Congress in the housing operations, because Congress itself, as well as the rest of us, have felt that there should be a greater check, not merely upon profits, but upon the actual cost of all work done for the government.

The new yards have been established, wherever possible, away from the congested districts, and while this was necessary, it brought with it the problem of transportation as well as of housing. We are arranging now for proper transportation, as well as for proper housing.

Training of new workmen for the yards has, in itself, proved a difficult task, but we are accomplishing it. We have established a large training school at Newport News to which 247 skilled mechanics, selected from 22 yards, have been detailed for a six weeks' course of intensive training to fit them as instructors for recruits brought into the various shipyards. Our latest report shows that 115 of these have completed the course and have been sent out as instructors. These men represent 16 trades. The men who are taking this instruction course will be capable of training an industrial army of 37,000 men. A department of training electric welders has also been established.

We have recruited a volunteer force of 250,000 highly skilled mechanics who have, with a patriotism that has made us all proud, agreed to hold themselves in readiness for our call. These men are being held in reserve in their present employment until such time as in the development of our yards the demand arises for their services.

In referring to what have been popularly termed our three fabricating shipyards, these assembling yards, with their 50 ways at Hog Island, 28 at Newark Bay, and 12 at Bristol, will, when they are in full operation, produce in a single year more ships than England, the greatest maritime nation of the world, has even been able to turn out in the same length of time. Already at the yards of the Submarine Boat Company at Newark Bay, 15 keels have been laid, and 13 more will be put down as soon as the remaining ways now in course of construction, are completed. By the time the last way is finished the vessel on the first way will be well on towards completion; and as soon as it is slipped into the water another keel will be laid in its place and we will thus have a continuous series of vessels dropping into the water from this yard at the rate of two a week. Even greater tonnage will be produced at Hog Island, with its larger number of ways and the bigger type of vessels which are being constructed there.

When the high point in the curve of production finally is reached, and the magnitude of America's shipbuilding program is realized it will be a continuous performance of production and launching. There is no doubt but that we are destined to be one of the leading shipbuilding nations in the world.

We will have the largest number of shipyards, the materials and the labor, and when our shipbuilding plants are completed and are well organized on sound business lines so as to produce ships cheaply and rapidly, we will not only produce sufficient ships to become the leader in the commerce of the world by furnishing transportation at reasonable rates, thereby performing a service to the rest of the world, but we will build ships in such large numbers and at such fair prices that we will become the mecca of the shipbuilding trade of the world.

I have outlined the entire situation—in utmost frankness—concealing nothing, for we have nothing to conceal. Shipping is the essence of the struggle in which the world is now engaged—the central beam in the whole war structure. If that fails, all else fails. We are engaged in a race with the submarine. We, of the Shipping Board, are alive to the needs of the situation. The whole government in Washington is alive to it, and there is complete co-operation to bring success in this greatest task to which America has set herself.—*International Marine Engineering*, May.

SCHWAB GIVES RECIPE FOR BUILDING SHIPS.—Charles M. Schwab to-day revealed how he purposes to put through the greatest shipping program the world has ever known in two words: "Rivalry; Enthusiasm." He had just returned from a trip through the plant of the Sun Shipbuilding Company at Chester.

"I am getting all my information as to existing conditions in the shipyards at first hand," he said, as he came from a conference in Rear Admiral Bowles's office. "I am seeing this job with my own eyes and drawing my own conclusions.

"The preliminary work in the shipyards of the Philadelphia district has been very well done. The launching of the 6000-ton *Tuckahoe* at the yard of the New York Shipbuilding Company, in Camden, within 27 days from the time work was started showed what we can accomplish in the construction of steel ships along the Delaware. It is a forecast of bigger things to come."

"But can you keep up that gait? Won't your executives and your workers tire?" he was asked.

"Not when they get two essentials to sustained quantity production," he replied. "These essentials are enthusiasm and rivalry. Virtually the whole secret of my success in handling big things may be summed up in these two words.

"You can't get men to endure extraordinary labor unless you arouse enthusiasm. You can't get them to go a stiff pace unless the man who tries to arouse them to such effort is himself a setter of the pace. The stern necessities of the times are such that production must pour out ships, munitions, and other warlike implements at a rate never before known. To achieve in such measure every American concerned in production must have a vision of free America outstripping autocracy in war as well as in peace. It is part of my job to extend that vision.

"Rivalry in the various shipyards goes hand in hand with enthusiasm. We have prizes and the less tangible, but quite as potential, incentives of proclaimed championships for rivaling gangs, pildring squads and other groups. Graphic charts are made which show at a glance how each yard is producing. The effect of this is to produce team work first in the groups comprising the working force in each yard and finally in the yard itself. The Pacific Coast just now is making the best record, but I am looking forward to a spurt along the Delaware River that will carry this district to the front."—*Evening Star*, 6/5.

SHIPPING BOARD ASKS FOR GRANT OF $2,223,835,000.—Estimates submitted to Congress to-day by the Shipping Board call for an appropriation of $2,223,835,000. For the cost of construction of ships authorized by the urgent deficiency bill of 1917, the board has requested an appropriation of $1,386,100,000 and for the purchasing and requisitioning of plants and material, $652,000,000.

Other estimates include: For acquisition or establishment of plants for shipbuilding, $5,000,000; for acquisition of lands and buildings, $50,000,000; for the operation of all ships proposed in the estimates, $500,000,000; for acquisition of plants for construction of concrete ships and for construction of concrete ships, $35,000,000; for recruiting and instructing officers for American vessels, $10,250,000; for the cost of development of port facilities, $25,000,000; for construction or completion of ships in shipyards and foreign countries, $55,000,000.—*N. Y. Herald*, 8/5.

SHIPPING BOARD'S GOAL 13,500,000 TONS A YEAR.—Working at full capacity the 157 shipyards now established in the United States will be able to turn out approximately 13,500,000 tons of shipping each year if three ships are launched annually from each of the ways. Most of the recent launchings have been accomplished in a much shorter time than that from the laying of the keel.

The United States Shipping Board and the Emergency Fleet Corporation are putting forth every effort to obtain the highest efficiency so that, with the completion of the big government-owned fabricating yards, the nation will be in a position to supply enough shipping for all of the men who can be trained this year and next.

There are at present 398 ways for steel ships. It is proposed that contracts for steel ships will call for an average of about 8000 tons each, and this program under the "three ships from each way" estimate would provide 9,552,000 tons.

The ways for wooden ships number 332, and these, on the same time basis, with wooden ships averaging 4000 tons, would provide an additional 3,984,000 tons, giving a total of 13,536,000 tons without taking into consideration construction work which may be done on concrete ships.

Here is what has been accomplished since the Emergency Fleet Corporation took over the shipbuilding industry:

Steel contract ships launched, 18; tonnage 136,250.
Steel requisitioned ships launched, 183; tonnage, 1,195,887.
Wooden ships launched, 35; tonnage, 108,500.
Total of steel and wooden ships launched, 236; tonnage, 1,440,627.
Steel contract ships delivered, 4; tonnage, 35,200.
Steel requisitioned ships delivered, 134; tonnage, 942,171.
Total of steel ships deliveries, 138; tonnage, 977,371.—*N. Y. Times*, 4/5.

TO GET 66 SHIPS FROM JAPAN.—*Ambassador Morris Concludes the Negotiations.*—Negotiations which have been in progress for some time between Roland S. Morris, the American Ambassador to Japan, and the Japanese Government and shipbuilders have been concluded. Sixty-six steamers, aggregating 514,000 tons dead-weight, will be turned over to the United States for use in the war. Deliveries of the vessels will begin in April of this year, and will continue until June, 1919. The ships have been placed in three categories, as follows:

First.—Twenty-four ships, 150,000 tons, will be chartered through the government to the United States Shipping Board for a period of six months. Deliveries will be made in April and May. The difference between the interallied charter rates and the rates paid by America—about 18,000,000 yen—will be paid by the Japanese Government.

Second.—Fifteen ships, aggregating 130,000 tons, new or partly built, for which the United States will release one ton of steel for one ton of shipping. The United States will buy the ships at a price which will vary according to delivery, which has been fixed at May to December.

Third.—Twenty-seven ships, of 234,000 tons, to be built in Japan between January and June of next year. The United States is to buy the ships, paying $175 a ton, and releasing one ton for two tons of shipping. The new vessels will average 8,000 tons apiece.—*Baltimore Sun*, 22/4.

TWO HUNDRED WOODEN SHIPS ADDED TO PROGRAM.—Two hundred wooden ships are to be constructed as an addition to the shipbuilding program of the Shipping Board. They are to vary from 4500 to 4700 tons, dead-weight. They will be of the *Dougherty* or *Ballin* type.

The vessels will be constructed in shipyards already established and will be allotted, the Shipping Board announces, among yards most efficiently managed. Construction will begin as soon as vessels building are off the stocks.

This will increase to 580 the number of wooden ships completed, building and planned.

The board also decided to authorize construction of 25 new seagoing tugs, increasing to 100 the number of such draft now building for the board.

The tugs will be employed in coast traffic, replacing those diverted overseas.—*Evening Star*, 3/5.

THE TONNAGE OUTLOOK.—The production of American shipyards in April has been estimated at 240,000 tons by the Commissioner of Navigation. This is almost 50 per cent more than in March, when 166,700 tons were completed. April ship deliveries reached 32, as against 9 in January, when the yards were hampered by unfavorable weather conditions. From now on our shipbuilding output should show a rising total from month to month. The progress thus far made justifies the belief that the production for 1918 may reach the goal set of 4,000,000 tons. It is doubtful, however, whether British yards can materially improve on their output for last year, when 1,161,000 tons were completed. Aside from the lack of man-power, Great Britain's imports of steel and iron ore from foreign countries has been very much cut down since the inauguration of Germany's ruthless submarine campaign. In a recent debate on the naval estimates before the Main Committee of the Reichstag, Admiral von Capelle spoke of the steel question as being the determining factor in shipbuilding. One of the most important economic results of Germany's U-boat warfare was the reduction of Great Britain's steel imports in 1917 by three-eighths, as compared with the year previous. To be exact, these steel imports fell from 763,000 tons to 497,000 tons. It is true that Sir Eric Geddes has denied that there was a lack of material, but British expert circles concede that the main reason for Great Britain's small shipbuilding output has been the scarcity of steel. Until this can be overcome by increasing the number of ships afloat so that Britain's steel imports can reach their former volume, no marked improvement in the amount of tonnage completed in shipyards of the United Kingdom would seem to be possible.—*Nautical Gazette*, 11/5.

FIFTEEN STEEL SHIPS, 92,000 TONS, IN WEEK'S DELIVERY.—Following the launching of the "wonder ship," the steamship *Tuckahoe*, built in 27 days at the Camden yards of the New York Shipbuilding Company, the Shipping Board announced to-day a record week of deliveries of steel vessels. In the week ended May 4 unofficial reports received by the Board show that 92,000 tons were delivered. If this average is maintained the output of steel steamships for the year will be 4,780,000 tons. As it is expected the weekly average will be increased, the year's output, it is estimated, should be five and perhaps six or seven million tons.—*N. Y. Herald*, 7/5.

THREE HUNDRED AND THIRTY-TWO-FOOT SHIP OFF WAYS; BUILT IN 27 DAYS.—Establishing the best of all war records in the building of ships, the New York Shipbuilding Company recently launched the single screw collier *Tuckahoe* 27 days after her keel was laid. Ten days from now the com-

pany promises to turn the new vessel over to the government fully completed for service.

The launching took place in the presence of the officials of the shipbuilding company, Edward Hurley, Chairman of the Shipping Board; Charles M. Schwab, and Senator David Baird, of New Jersey. Miss Helen Hurley, daughter of Mr. Hurley, christened the vessel.

The vessel is built after the English rather than the American type, and is 332 feet and 6 inches long. Her beam is 49 feet 6 inches and depth 29 feet 6 inches. She weighs 5548 dead-weight tons. The steady arrival of material and the loyalty and energy of the men are given as the reason for the remarkable record in building.

The *Tuckahoe* entered the water with boilers, stacks, masts and gun mounts, all of which were installed on the vessel during the building.—*N. Y. Herald*, 5/5.

COMPENSATION FOR DUTCH SHIPS.—It is stated that America has 69 Dutch ships, of which only 30—all over 2500 tons—are to be used in Atlantic trade. The owners will be paid on gross or deadweight tonnage a sum nearly three times the amount the British Government pays for its ships. Insurance will be included, and the only deductions are for the cost of repairs making ready for the first voyage. Owners are to be paid in cash for all losses, or have their ships replaced as soon as possible after the war.—*Nautical Gazette*, 18/4.

HOLLAND-AMERICA PIERS TAKEN BY THE GOVERNMENT.—*Project Under Way to Make Hoboken Largest Terminal on the Atlantic.*—The Holland-America line piers at Fifth Street and the Hudson River, Hoboken, were taken over by the government for the duration of the war, through an arrangement between the War Department and Captain Victor Larsen, president of the steamship company.

Negotiations are under way for the taking over of the piers of the Scandinavian-American and Ellerman-Wilson lines, which, when completed, will make Hoboken the greatest European shipping point on the Atlantic seaboard, second only to Bush Terminal in Brooklyn.

In a statement from the office of the superintendent of the Scandinavian-American line's piers, it was made plain the negotiations were well under way and that, while an agreement had not been reached as yet, definite action was expected shortly. One of the problems which have hindered the settlement has been the housing of Scandinavian shipping while in this port.

The development of Hoboken as the largest point of embarkation on the Atlantic seaboard began less than a year ago, when the government took over the piers of the Lamport-Holt line at Sixteenth Street. These were reconstructed to accommodate a greater amount of traffic, but the need of expansion became apparent within a short time.

It was then the Holland-America line piers, which lay further to the southeast, were chosen as the next development.

Negotiations were begun which ended in the government taking over the piers. They will be reconstructed, as were those of the Lamport-Holt line.

When the piers of the Scandinavian-American and Ellerman-Wilson lines are requisitioned the water front of Hoboken will be entirely under the control of the War Department. As a point of embarkation it will have facilities for shipping foodstuffs and supplies to the armies overseas which will equal those of Bush Terminal.—*N. Y. Herald*, 20/4.

FREE PORTS WANTED FOR "WAR AFTER WAR."—Business America is urging Congress to prepare the country for the "war after the war" for world trade. The first step was the passage of the Webb law which permits exporters to combine selling agencies without fear of anti-trust statutes. Now Congress is asked to provide "free ports" for United States water-front zones into which goods may be imported without payment of duties

or customs inspection. In these "free ports" imported materials may be rehandled, repacked, mixed, cleaned or even manufactured and then exported to other countries.

Goods sent into the country from free ports will pay duty, of course. The tariff policy of the government is not to be affected in any way. The purpose of the "free ports" is to handle the world's transshipment business, which now amounts to billions yearly.

Foreign trade will sail hundreds of miles to avoid red tape and expense of a custom house. Free-trade England has built up much of her commercial prosperity because of this fact.

Germany is a protectionist country like America, but before the war she was cutting into Britain's transshipment business by maintaining the old free ports of Hamburg, Bremen and Lubeck. Within portions of the harbor fronts of these cities trade and manufacture is free. The only customs activity is prevention of smuggling into the interior.

The Federal Trade Commission will shortly recommend at least four free ports for the United States at New York, New Orleans, San Francisco and the Canal Zone.

Legislation, which probably will follow the commission's report, will be drawn to provide that any city may build and operate a free port as a public utility. Under strict regulation by either the government or the cities, private corporations will also be allowed to build and operate such ports and terminals.

The experience of Germany and Denmark shows that such zones are successful. As a rule, however, no great amount of manufacturing is carried on in them beyond the repacking, cleaning, mixing or classification of raw materials for re-export or for import into the country in which the free ports are located.

The movement of ships is speeded up by the elimination of customs inspection. The warehouses in the zones are the most important feature next to the docks, and usually carry immense stocks of goods, awaiting shipping orders.—*Baltimore Evening Sun*, 26/4.

POOLING OF SHIPS COMES TO FRONT.—The pooling and operation by an inter-allied shipping board of all tonnage now operated by the United States, Great Britain, France and Italy is being jointly discussed by these nations.

Distribution of tonnage as the war sweeps into its most desperate stage is becoming more and more a vital factor in the outcome. Differences of opinion as to whether food supplies or men should have priority have caused vast confusion in recent months with the rapidly changing situation in France.

Official diplomatic advices announced a meeting of the inter-allied economic committee in France to discuss the tonnage distribution.

Comparable to Foch's Command.—The pool plan would bring the same co-ordination in the shipping shortage that was brought on the western front by the appointment of General Foch as generalissimo of all Allied troops.

The plan is to put control of the world's commerce in the hands of an inter-allied board, with authority to direct shipments of supplies, food, munitions and perhaps even troops.

Probably 25,000,000 tons of shipping would be at the disposal of the board. The board would have authority to grant priority of shipments and to withhold shipments. Under present methods of operation each war government operates its ships to fetch and carry the food and supplies it needs for its own people. This sometimes works to delay other war governments. It also often spells waste of cargo space through duplication, cross hauls and operation of ships in ballast.

Would Save Wasted Space.—It is urged a supreme shipping authority would save this waste.

Officials at Washington were reluctant to discuss the proposal beyond saying it had been discussed. President Wilson will, of course, decide the fate of the proposal. He has not sanctioned it to date.—*Baltimore Evening Sun*, 25/4.

There is talk of the establishment of an American Lloyds on the ground that American shipping interests may be seriously handicapped in the post-war economic competition if we should have to depend on a primarily British undertaking for shipping intelligence and vessel ratings. Whatever else may be the outcome of the war it appears certain that the British Lloyds will no longer enjoy a virtual monopoly in its chosen field of activities. Less than a year ago representatives of German shipping and marine insurance interests met at Hamburg and declared that Lloyds was the backbone of Britain's economic war against Germany. Were Lloyds to carry out its threat of bringing no news of German vessels after the war and of refusing to mail any of their daily and weekly reports of vessel movements and casualties to Germany, German interests would suffer incalculable injury. The absence of reliable shipping intelligence would result in a total disorganization of the business of marine insurance and all branches of the import and export trade would be crippled. Hence to guard against such a grievous injury to Germany's foreign trade when economic competition was renewed it was determined to found a German shipping intelligence bureau after the pattern of Lloyds for the protection and maintenance of German interests all over the world. The cost of establishing such a corresponding institution was placed at 2,000,000 marks. In Holland, the Dutch Steamship Owners' Union is looking into the establishment of a Dutch classification bureau in order to do away with the present dependence of Netherlands shipowners on foreign bureaus when it comes to the construction of vessels. The creation of serious rivals to Lloyds after the war is therefore certain, and the United States will before long have to decide the question whether its best interests will not be served by founding an American institution of like character.—*Nautical Gazette*, 18/4.

ARMY

ARMY OF 3,000,000 IN FRANCE NOW IS DESIRED BY HOUSE.—"Three million men for Pershing in France."

This is the goal which members of the House Military Affairs Committee hope to reach before the army appropriation bill is passed. This will be coupled with the creation of sufficient reserve to maintain an army of that size, no matter how long the war may last, if the bill goes through in accordance with the wishes of its advocates.

The size of the American Army is the one big question to be determined in the final consideration in committee of the army bill, which is to be taken up next week. Newton D. Baker, Secretary of War, will be the first official of the department to appear before the committee to advise with it regarding the number of men to be put into military service. He will be followed by Provost Marshal General Enoch S. Crowder, if the program now outlined by the Military Affairs Committee is followed.

If necessary, other high officials will be summoned later, all for the purpose of reaching a determination regarding the magnitude of the fighting force America is to put into the European battle line.

Ever since the German drive began sentiment in Congress for increasing the size of our army has been growing. It is about the only important provision in the army bill which was not whipped into shape by the Military Affairs Committee before Secretary Baker went to Europe for his survey of conditions there.

Representative Dent, democrat, of Alabama, chairman of the Military Affairs Committee, has stated many times that completion of the army bill awaited the return of the Secretary of War and that it could be finished

and reported to the House promptly after his recommendations were submitted.

The question of man power, however, was not at the acute stage when Secretary Baker left Europe that it has reached since then. Premier Lloyd George frankly has told the House of Commons that America must place more men in the field, that the age limit of the draft in England must be increased. Conscription in Ireland has been voted. These are desperate measures, and it has brought home to this country the fact that America must be ready to fill the vacancies created in the ranks of the Allies by the tremendous drain due to the Prussian onslaught.

Representative Ashton C. Shallenberger, democrat, of Nebraska, of the Military Committee, is one of the moving spirits in the committee for a proposal to increase the age limit to 40 years, and repeatedly has urged that an army of 3,000,000 men be put at the disposal of General Pershing. Representative Dent recently stated on the floor that should Secretary Baker say the word, he is ready to vote for a largely increased American Army.

It has been remarked frequently that although some formidable opposition to various bills affecting the operation of the Selective Draft law has appeared in the last two weeks, no one has vetoed a single objection to increasing the size of the army. Should the House Committee on Military Affairs report a bill carrying substantial increases, it is believed the House would enact it speedily.—*N. Y. Herald*, 11/5.

GENERAL CROWDER ASKS DRAFT BILL CHANGE.—Provost Marshal General Crowder to-day requested Congress to eliminate from the bill extending the draft of youths now 21 years of age, the amendment putting at the bottom of the eligible list those who would register under the measure, and asked that the bill basing draft quotas on the number of men in class 1 be amended to make its operation retroactive.

General Crowder made his request in letters to the chairmen of the Senate and House military committees.

Of the proposal to put the new registrants at the bottom of the list of eligibles, General Crowder said:

Says His Plan Fairest.—"The plan proposed by this office would result in these registrants being given order numbers scattered throughout the entire list of order numbers. This seems to be fairer than the plan proposed by the amendment. The result of the House amendment in many jurisdictions will be to delay the calling of these young men for a considerable time. In the meantime their status will have changed, they will have married or become integrated with the industries of the country.

"Moreover, it establishes a precedent which may be appealed to, provided aliens are registered under the provisions of the new legislation based upon treaties to be negotiated."

The plan to make the quota law retroactive would apply it to men of the new draft called while the legislation is pending. Delay in enactment of the legislation, General Crowder wrote, necessitated the retroactive feature.—*Washington Evening Star*, 30/4.

CHARLESTON TO BE MADE BIG SEAPORT AND ARMY DEPOT OF SOUTH ATLANTIC.—The United States Government has requisitioned 2000 acres of land at North Charleston and will immediately begin work on the government's development of Charleston into the principal seaport of the South Atlantic, at a cost of $20,000,000. It is known that 4000 acres are eventually to be used by the government at North Charleston, the present 2000 acres for the purposes of the Quartermaster Department and the Ordnance Department, and other lands for a great base hospital and a remount station for 20,000 horses. Actual work on the remount station has already begun.

Permanent concrete warehouses and piers will be built for the Quartermaster Department. They will be hurried to completion for use during the war, but will continue to be used after the war. The plans call for a concrete pier, with a frontage on the Cooper River of between 3000 and 4000 feet, with facilities for handling the very largest vessels afloat and all kinds of freight.

Concrete warehouses will be built behind the pier, which will be erected in a continuous line, without slips, so that vessels will load and unload lengthwise. There will be room for continued expansion of this immense pier, it is understood. Major J. L. Lee, who has been in Charleston for some time awaiting orders, will be the engineer officer in charge of construction.

For the Ordnance Department large ammunition storage depots will be built and other construction probably undertaken. This, it is understood, will be on part of the 2000 acres already requisitioned.

The remount station, which will be for 20,000 horses and mules, will be rapidly constructed, work having already commenced. It will be equipped with corrals, quarters for the men, a large horse hospital and other buildings.

It is understood that about 600 acres will be used for the base hospital that is contemplated and that the hospital will have 10,000 beds and be thoroughly equipped.

The effects of these proposed developments are already being felt at North Charleston, which is a suburb of Charleston, and land nearby is selling rapidly to people who are expecting to build homes and business structures there. Two banks have already been chartered, a large church is about to be built and several stores have been announced.

The remount station will employ about 3000 men. The other developments will employ several thousands, it is believed, though no statement as to the numbers has yet been made.—*N. Y. Herald*, 10/5.

MEDALS AND INSIGNIA AUTHORIZED FOR U. S. SOLDIERS IN FRANCE, WITH ARMY RULES AND REGULATIONS GOVERNING THEIR BESTOWAL.—1. By direction of the President the following decorations and insignia are authorized:

(a) Distinguished-service cross.

A bronze cross of appropriate design and a ribbon to be worn in lieu thereof, to be awarded by the President, or in the name of the President, by the commanding general of the American Expeditionary Forces in Europe to any person who, while serving in any capacity with the army, shall hereafter distinguish himself or herself, or who, since April 6, 1917, has distinguished himself or herself, by extraordinary heroism in connection with military operations against an armed enemy of the United States under circumstances which do not justify the award of the medal of honor.

Service Medal and Chevrons.—(b) Distinguished-service medal.

A bronze medal of appropriate design, and a ribbon to be worn in lieu thereof, to be awarded by the President to any person who, while serving in any capacity with the army, shall hereafter distinguish himself or herself, or who, since April 6, 1917, has distinguished himself or herself by exceptionally meritorious service to the government in a duty of great responsibility in time of war or in connection with military operations against an armed enemy of the United States.

(c) War-service chevrons.

A gold chevron of standard material and design, to be worn on the lower half of the left sleeve of all uniform coats, except fatigue coats, by each officer and enlisted man who has served six months in the zone of the advance in the war, and an additional chevron for each six months of similar service thereafter. Officers and enlisted men of the Aviation Service on combat-flying duty in Europe will be credited for the war-service chevron with the time they may be on duty.

The Wound Chevron.—(d) Wound chevrons.

A gold chevron of pattern identical with that of the war-service chevron, to be worn on the lower half of the right sleeve of all uniform coats, except fatigue coats, by each officer and enlisted man who has received, or who may hereafter receive, a wound in action with the enemy which necessitates treatment by a medical officer, and an additional chevron for each additional wound; but not more than one chevron will be worn for two or more wounds received at the same time. Disablement by gas necessitating treatment by a medical officer shall be considered to be a wound within the meaning of this order.

Medals of Honor in France.—2. During the present emergency, whenever a recommendation for the award of the medal of honor reaches the commanding general of the American Expeditionary Forces in Europe, he is authorized to cable his recommendation for immediate action and to hold the papers until a reply is received. In the event that his recommendation is approved, he will note the action taken in his indorsement when forwarding the papers in the case and will present the medal to the recipient as the representative of the President, or will delegate a suitable officer to act in that capacity.

In any case where the person recommended for the award of the medal of honor is at the time of the recommendation apparently fatally wounded or so ill as to endanger his life, the commanding general of the Expeditionary Forces in Europe is authorized to act immediately upon the recommendation as the representative of the President, afterwards reporting his action by cable.

3. Whenever a recommendation for the award of the medal of honor is approved by cable, and whenever a report is received announcing the award of the distinguished-service cross by the commanding general of the American Expeditionary Forces in Europe, and whenever the distinguished-service medal is awarded, such award, with a statement of the circumstances in each case, will be announced in general orders of the War Department by the adjutant general of the army without unnecessary delay.

May Be Posthumously Awarded.—4. The distinguished-service cross and the distinguished-service medal may be awarded posthumously to persons killed in the performance of acts meriting such award or to persons whose death from any cause may have occurred prior to such award. The medal so awarded will be issued to the nearest relative of the deceased person.

5. No individual will be entitled to more than one distinguished-service cross or one distinguished-service medal, but each additional citation in War Department orders for conduct or service that would warrant the award of either of these decorations will entitle the person so cited to wear upon the ribband of the decoration and upon the corresponding ribbon a bronze oak leaf of approved design, and the right to wear such oak leaf will be announced as a part of the citation. Other citations for gallantry in action published in orders issued from the headquarters of a force commanded by a general officer will be indicated in each case by a silver star three-sixteenths of an inch in diameter worn upon the ribband of the distinguished-service cross and upon the corresponding ribbon.

Forwarding of Recommendations.—6. Recommendations for the award of the distinguished-service medal will be forwarded to the adjutant general of the army through regular channels.

7. When an officer or enlisted man is admitted to a hospital for treatment of a wound, or when an officer or enlisted man is treated for a wound without being admitted to a hospital, the commanding officer of the hospital, or, in the latter case, the medical officer who treats the wound, will furnish the commanding officer of the wounded person with a certificate describing briefly the nature of the wound and certifying to the necessity of the treatment. This information may be furnished to commanders of higher units in the form of certified lists, and will be transmitted by them to the commanding officers concerned.

8. Commanding officers will forward to the adjutant general of the army, through military channels, lists in duplicate of those officers and enlisted men of their commands who have been honorably wounded in action, with a statement in the case of each individual, showing time and place wounds were received and organization in which they were then serving. Whenever a report is made of an action, it will be accompanied by the above-described list, and by certified copies of the medical officers' statements described in paragraph 7.

Granting Rights to Wear.—9. Upon receipt of lists of wounded the commanding general of the American Expeditionary Forces in Europe is authorized to grant the right to wear the wound chevron to the persons concerned, and he will note his action by indorsement in forwarding the papers.

10. The right to wear the wound chevron shall be confined to those who are authorized to do so by letter from the adjutant general of the army or from the commanding general of the American Expeditionary Forces in Europe.

11. The war-service chevron and the wound chevron shall be as described in paragraphs 13½ and 84½, Special Regulations No. 42 (Uniform Specifications) (see Changes No. 2); will be worn as described in paragraph 74½, Special Regulations No. 41 (Uniform Regulations) (see Changes No. 2); and will be furnished as directed in sub-paragraph 6 of paragraph 66, Compilation of General Orders, Circulars and Bulletins, War Department, 1881-1915.

Verifying Rights to Wear.—12. Requests for the issue or purchase of these chevrons will be accompanied by a list of the persons for whom they are desired, for the information of the commanding officer who authorizes the issue. The officer, before approving a requisition or a purchase, will verify the right of the persons concerned to wear the chevrons requested. Requests for authority to wear the wound chevron on account of wounds received prior to the present war will be forwarded with all available evidence to the adjutant general of the army for verification through the War Department records and appropriate action.

13. Section XI, General Orders No. 134, War Department, 1917, is rescinded.

(210.5, A. G. O.)

By order of the Secretary of War:

JOHN BIDDLE,
Major General, Acting Chief of Staff.

Official:
H. P. MCCAIN,
The Adjutant General.

ORDNANCE AND GUNNERY

VELOCITY AND RANGE OF GUNS, II.—*How Super-Range Can Be Secured with Existing High-Powered Rifles.*—By J. Bernard Walker.—In an article on "Velocity and Range of Guns," three different methods of securing extreme range were considered—namely, a gun using a compound shell, a gun using a sub-caliber shell, and a gun of standard type, but with a large powder chamber and extremely long barrel.

As regards the compound shell, it was shown that, because of gyroscopic action the inaccuracy would be so great as to render the gun useless. In addition to that fundamental difficulty, the structure of each super-caliber shell would have to be made of such thickness and strength to resist the bursting stresses of the firing charge that each successive shell would be of very greatly reduced diameter, and the final, explosive shell that was intended to complete the trajectory would be so small as to be useless even for bombarding purposes. If the final shell were to be of any serviceable

size, such as 8 to 10 inches, the diameter of the compound shell, as assembled for firing, would be so great as to require the construction of a gun far exceeding in weight and length the heaviest artillery of the present day. In addition to the great thickness necessary in the wall of each shell, to enable it to act as a gun for the shell within it, there would be the difficulty of the large powder spaces required to give the desired velocities. These powder chambers, if we can call them that, would be so large that the compound shell would be of an absolutely prohibitive total length. In this connection, the space required for the powder charge of one of the most powerful guns in existence is very significant. The cartridge for this particular gun is nearly 18 inches in diameter, weighs about one-third of a ton, and is no less than 10 feet in length. So we are safe in stating that no practical gunmaker will ever attempt to construct a long-range gun upon this principle.

Another problem that would have to be solved is that of providing a reliable time fuse for firing the successive shells at the desired point in the trajectory. The elevations attained by the shells of anti-aircraft guns are moderate compared with those which the shells of a 75-mile range gun must attain. Yet great difficulty has been experienced in providing fuses

A 15-INCH 50-CALIBER KRUPP NAVAL GUN, SUB-CALIBERED TO 9.4 INCHES.

It is understood that the Germans are utilizing some 15-inch guns, built for their latest battleships, for bombarding Paris. This is done by inserting a liner (shown above in white) and boring it to take a 9.4-inch shell. Krupp claims for the 15-inch shell a velocity of 3100 foot-seconds. With a full charge of suitable powder the 9.4-inch shell would have a velocity of 6200 foot-seconds. In the drawing the liner is broken away and a 15-inch shell inserted for comparison.

that will function reliably at the extreme ranges of anti-aircraft weapons; although since the outbreak of the war, the efforts of many inventors have been directed to the problem. The rate of burning of a time fuse depends greatly upon the density of the air. The irregular density of the atmosphere at the summit of the trajectory of high-angle fire howitzers and anti-aircraft weapons is a condition that has greatly complicated the calculations of the artillerist.

Secondly, as regards the use of a sub-caliber shell in a large-caliber gun, while it is true that the velocities vary inversely as the square root of the weight of the shells, and, as has been shown in the case of a 16-inch howitzer, it would be possible to secure high velocity with existing guns, it has not been possible to provide a cradle that will stand up under the enormous pressures and the severe torsional stresses to which it is subjected. Furthermore, great difficulty has been experienced in releasing the shell from its cradle, and the flight of such shells has proved to be extremely erratic.

The third method suggested, namely, that the Germans had built an entirely new gun with large powder chamber and possibly 100 calibers of length, is the most reasonable proposition of the three; but since the article referred to was written we have learned on good authority that the Germans

have not built a special gun, but have made use of some of the new 15-inch 50-caliber guns which the Krupp works have built for one of the latest German battleships. It is stated that two or three of these guns have been sub-calibered by inserting a tube for the full length of the bore, so as to make it possible to use a smaller shell, having behind it a very large charge of powder, and driven through an exceptionally long path down the bore. As to the size of the sub-caliber shell, reports from Paris are contradictory—some stating that an 8.8-inch shell is being used and others a 9.5. The ordnance tables of the Krupp works include an 8.2-inch gun and a 9.4-inch gun. It is probably that the 9.4-inch shell is employed.

It would be perfectly feasible to heat the gun and insert a liner having an external diameter slightly larger than the bore of the gun (15 inches), and secure it firmly in position by the well-known method of shrinkage. The tube could then be bored to 9.4 inches and rifled. In this case the enormous charge for a 15-inch gun would be available for driving a 9.4-inch projectile through a gun that was 80 calibers long. Of course, it would be necessary to design a quicker-burning powder, in order to make sure that the whole charge was burned before the shell left the muzzle. The 15-inch shell weighs 1680 pounds, and according to the Krupp tables it has a muzzle velocity of 3100 feet per second (there is much skepticism as to this high velocity among ordnance men in this country, but we will assume that the Krupps are doing it). The 9.4-inch weighs 420 pounds. The square root of 1680 is 41 and the square root of 420 is 20.5, and accepting 3100 feet per second as the velocity of the heavier shell, we get a velocity for the 9.4-inch shell of 6200 feet per second.

If it be true that some of the guns built for one of the latest battleships of the German high seas fleet have been diverted to the German front in Picardy, we are justified in believing that the German Admiralty is not contemplating, at least for the present, any sortie into the North Sea for the purpose of breaking the blockade.

If it were possible to construct a cradle that was sufficiently strong to stand up to its work, and that would disengage itself from the shell without affecting the flight of the latter, it would be possible to fire a larger and more destructive shell than the 9.4-inch shell now being thrown into Paris. Take, for instance, our new army 16-inch gun, which is designed to fire a 400-pound projectile with a velocity of 2700 feet per second. If a 12-inch projectile weighing, with its cradle, 1100 pounds, were fired from this gun, it would be found by the formula referred to above, that the shell would have a velocity at the muzzle of about 4000 feet per second.

The possibilities in the direction of super-range, even greater than that obtained by the German gun, were made the subject of study by the Bureau of Ordnance of the Navy, and a design was drawn up for a gun which would give ranges far superior to that attained by the gun now firing upon Paris. The study of the problem, however, was merely an academic one; for our ordnance officers realize that such a gun has no tactical value, and they know that the United States will never so far depart from its standards of civilized warfare as to bombard indiscriminately the inhabitants of a great city.—*Scientific American*, 27/4.

THE LONG-RANGE GUN.—The following particulars of the long-range guns, and their projectiles, which are bombarding Paris, are given by *Le Génie Civil*. The shell is about 210 mm. in diameter, and its real length not more than half a meter, but it is lengthened by a false nose of sheet-metal, which increases the length to about 900 mm. It has a fuse at the base, and, possibly, one also at the nose, to double the chances of a burst. As a matter of fact, not a single unexploded shell has yet been found. It has two copper driving bands, between which are two bands in the steel, cut with rifling grooves. Its weight is between 100 and 120 kilos. The thickness of the walls being between 30 and 40 mm., the internal capacity is no more than 6 liters, sufficient for only 10 to 11 kilos of high explosive.

From this fact it results that the shell is broken into few pieces, and the fatalities caused by it are relatively small.

The initial velocity of the projectile must be between 1200 and 1400 meters per second, and our contemporary recalls that 20 years ago a gun of 164.7 mm. was constructed at the National Foundry at Rouelle, and was fired with a pressure of 2800 kilos per square centimeter, and gave a muzzle velocity of 1200 meters per second. Its length was 90 calibers. It was only tested at low angles of elevation, and not for maximum range. It is shown by an expert artillerist, who writes for the *Génie Civil*, that the problem turns largely upon the selection of a very slow burning powder, so that a high pressure may be carried right up to the muzzle. It is pointed out that the wear of the gun, even though the maximum pressure does not exceed that usually employed, is likely to be very rapid. The gun is assumed to be 110 calibers long, the charge 183.6 kilos, and the maximum pressure 2500 kilos per square centimeter, say, 15 tons per square inch.—*Engineer*, 12/4.

WILL BUILD 100-MILE GUN.—Connecting Mr. Gary's announcement with the *Herald* despatch of several days ago in connection with the new large U. S. gun plant, it was recalled in the financial district that reports had been current of a new super-gun which the government had been testing and which had been manufactured near Philadelphia. Several banking houses learned that the new gun, which then had passed two tests, was expected to have a range of a hundred miles.—*N. Y. Herald*, 10/5.

THE CREUSOT 520-MILLIMETER WEAPON—THIS WAR'S MOST POWERFUL GUN.—The recent publicity given the long-range German gun has quite overshadowed the French 520-millimeter gun, which, after all, remains the most powerful gun now in use. Whereas, the German piece throws its shell some 75 miles, the French gun is relatively a howitzer hurling a huge shell a comparatively short distance. Practically speaking, it is a fort wrecker of proved powers.

For some time there had been rumors of a 520-millimeter gun employed by the French artillerists, but ordnance experts and others familiar with the difficulties in the way of producing such a powerful piece of mobile artillery did not place much credence in the unofficial descriptions; they preferred to wait for some definite evidence.

It was not until the French official films presented the 520-millimeter gun to American audiences that ordnance experts and others were convinced that the huge mobile howitzer was a *fait accompli*. The accompanying photographs which have recently reached this country show one of these huge guns receiving the final touches at the Creusot works in France, and another similar gun in action. It appears that the gun is a howitzer mounted on a railroad carriage, and fires a shell measuring 20.47 inches in diameter. As a fort wrecker, this gun is undoubtedly without peer, the German 420-millimeter and the Austrian 300-millimeter howitzers having been outdone by a good margin. During the French attack on Fort Malmaison it is reported that a single 520-millimeter shell crumbled this permanent fortification upon which the Germans had spent so much time and labor.—*Scientific American*, 4/5.

During the past year the latest type of naval 16-inch gun was completed for our new battleships; it throws a projectile weighing 2100 pounds.—*Official Bulletin*, 30/4.

U. S. STEEL TO BUILD BIGGEST OF GUN PLANTS.—The largest ordnance and munitions plant in the world, probably surpassing in capacity the Krupps and the Bethlehem work combined, is to be built for America by the United States Steel Corporation.

Elbert H. Gary, chairman of the board of the corporation, made a formal announcement yesterday that it had undertaken the construction of such a plant "at the solicitation of the Secretary of War," confirming a despatch from the *Herald's* bureau in Washington several days ago that the Secretary of War had asked for $4,000,000,000 for the construction of an ordnance plant by the steel corporation.

In that despatch it was explained the great sum was to be used solely for the construction of the plant, and that among the "big gun" products would be a super gun of astonishing range, "greater than any yet used," and that it would be manufactured in very large quantities.

Mr. Gary's Statement.—The statement issued by Mr. Gary follows:

"At the solicitation of the Secretary of War, the United States Steel Corporation has undertaken to construct and equip for and at the expense of the government upon a site to be located in the interior of the country a plant for the manufacture of cannon and projectiles of large sizes and in great quantities and to operate the same when finished.

"At best the time required will extend over a considerable period and the cost will be large, but the work will progress with all practicable speed and economy in the use of money will be practised. It is hoped and expected the results will be creditable to the country.

"The work will be in the immediate charge of a committee consisting of a vice-president and the controller of the corporation and eight others designated from the officers (presidents or vice-presidents) of the various manufacturing subsidiary companies, and all selected because of their education, experience and peculiar fitness. This committee will keep in close touch with the building and operating organization which is being formed, and with the officers of the Steel Corporation and with the War Department.

"Officers of the corporation and of subsidiary companies will receive no compensation for their services.

"Accurate books of account will be kept which, with all records, files and other documents and papers, will be open and subject to examination by government officials or other properly appointed representatives.

"General plans are being rapidly prepared and will soon be ready for examination by the Ordnance Department or other bureau, and when approved, the corporation will be given a free hand in construction and operation, holding itself responsible for the faithful performance of the duty imposed by the terms of the contract.

"The corporation, in consequence of the magnitude of its business, most of which, directly or indirectly, is in aid of the military necessities of the government and its allies, had hoped to avoid the necessity of engaging in work of the kind now entered upon, but was persuaded by the War Department that it was imperatively required under existing conditions."

To Turn Out Big Guns.—At Washington last night the War Department issued the following statement:

"The Secretary of War has entered into an arrangement with the United States Steel Corporation by which that corporation undertakes to construct and equip, for the government, a modern ordnance plant, upon a site located in the interior of the country, to be selected.

"A committee formed from officers of the corporation and its subsidiary companies, men fitted by education and experience, will be in immediate charge of the work. These men will receive no compensation for their services. The plant is to be built, equipped and operated at the expense of the government of the United States Steel Corporation without profit. Cannon of the largest calibers will be manufactured, as well as heavy projectiles in large quantities.

"While the United States Steel Corporation, like other steel manufacturers, is full of work and has always gladly undertaken production of finished materials wanted by the government, it was persuaded by the

Secretary of War to undertake this additional task, which it patriotically agreed to do, and has placed its best energies and the strength of its economic position at the disposal of the War Department."

Probably Near Pittsburg.—Neither the Steel Corporation nor the government was prepared to say where the great plant would be built nor exactly what it would produce, but it is understood in circles close to those at work on the project that the plant will be near Pittsburg and that it will produce field and coast defence guns of the largest caliber and shells for them.

That the plant is to be much larger than any other in the world is indicated by the request of the Secretary of War for Congress to provide $4,000,000,000 to pay only the cost of construction.

Soon after the start of hostilities in Europe Mr. Gary announced the Steel Corporation would not enter the munitions field, but would content itself with supplying steel and other of its products to the Allies and to domestic consumers. Mr. Gary at that time, however, promised that in the event of the United States being drawn into the war the United States Steel Corporation would be prepared to place its entire facilities at the disposition of the government.

It was recognized in the steel trade that if those facilities were made available for gun making purposes, the Steel Corporation could easily outdo all other ordnance making plants in the world. The arrangement between the United States Steel Corporation and the government is regarded as being in line with Mr. Gary's promise.

Bethlehem Is Largest.—At present the largest ordnance plant in this country is that of the Bethlehem Steel Corporation. At the head of that company is Charles M. Schwab, Director General of the United States Emergency Fleet Corporation, who was the first president of the United States Steel Company.

Another large American ordnance plant is owned by the Midvale Steel and Ordnance Company, of which William Ellis Corey, who succeeded Mr. Schwab as president of the United States Steel Corporation, is the head.

Since war began the Bethlehem plant has been expanded to an extent that placed it ahead, according to its managers, of the Krupp works in Germany.

The new plant to be built by the United States Steel Corporation will be ready, it is expected, to start work in about 12 months.—*N. Y. Herald*, 10/5.

NEW TRENCH ENGINES ARE USED BY GERMANS.—A new model "minenwerfer," the terrible trench engine which hurls through the air without noise of discharge and with no other warning than a slight whizzing sound missiles charged with high explosives, has appeared in the German trenches. It is called the "flugelminenwerfer" and heaves a 24-cm. projectile, which weighs 212 pounds and is guided by four wings attached to the sides, any distance up to 1200 meters.

There are also other new models of "minenwerfers," heavy, medium and light. This weapon is very popular with the Germans for trench fighting, although the new regulations allow each battalion of infantry only four light pieces, instead of eight, as heretofore. The "minenwerfer" crews belong to the pioneer companies, are commanded by artillery officers and operate in strict connection with the infantry regiments. Infantrymen dislike exceedingly to see a "minenwerfer" take up position in their trench, for it means invariably a heavy reciprocal bombardment as soon as a few shells are fired. The "minenwerfer" operators cannot claim to belong to the most popular branch of the army.

The chapter of "minenwerfers" in the new German rulebook, "Regulations Governing Trench Warfare," is very instructive. Directions are given to divide carefully all missions between the artillery and the "minenwerfer," taking into account the possibilities of each arm and the end to be attained. "Minenwerfers" should be used in place of artillery every time

it is possible for short range destructive fires, barrages, annihilation fires and for worrying the enemy, as thereby considerable economy is realized. It is insisted that they be used for accompanying assaulting troops.

The information received concerning the number and location of the German aviation schools is rather contradictory. In addition to the army instruction camps, it is probable that each of the big aeroplane factories has a special school for pilots attached to it, where machines are tried out and put in shape and where student pilots come to begin their apprenticeship. The instruction of pilots is carried out in the interior of Germany. It is begun at an aviation school (military or civilian) and is completed at a depot escadrille.

Observers are trained in the schools of the interior of Germany or at the aviation parks in northern France. The training consists of conferences on tactics and technics and practical exercises. Conferences deal with the German and enemy aviations, wireless telegraphy, artillery fire regulating, aerial photography, weather service, flying by the compass and the stars, writing up of reports, etc.

The practical exercises include flights with and without tactical missions (profiting by the movements of troops which may be going on in the neighborhood), exercises in machine-gun firing at targets on the ground and exercises in aerial combat. During these combats, which last at least 15 minutes, the aeroplane attacked and the assailant machine photograph each other, which permits a later study to be made of the nature and usefulness of the maneuvers prescribed to the pilot by the observer.

The bomb throwers receive a special instruction. The student takes his seat in an elevated fuselage and, using a sight, drops arrows on an endless chain about 10 yards long and of a certain width, on which is painted a landscape and which moves under him at varied quicknesses.—*Evening Star*, 30/4.

GUNS COMPARED WITH TORPEDOES.—If the total losses among warships sustained by all the belligerents in the last three and a half years be reckoned up it will be found that the majority have been caused by torpedoes and mines. Gun-fire has accounted for comparatively few. Yet it would be erroneous to conclude from these figures that either the torpedo or the mine is a more formidable weapon than the gun. For obvious reasons, the record of the torpedo impresses the imagination of the non-technical public, and, doubtless, to many people the U-boat would be a more appropriate symbol of modern naval power than the battleship. But naval officers, with few exceptions, are convinced that the gun remains the supreme and decisive instrument of naval combat. And it is not difficult to show why this should be so. Within the past decade the science of under-water attack has certainly made remarkable progress. At the outbreak of the war the latest torpedoes were credited with a range of 10,000 to 12,000 yards, and with the power of traveling a distance of 3000 yards at a velocity of 45 to 50 knots. At the same time the explosive charge contained in the warhead had been so increased that a single hit was expected to prove fatal to anything afloat. No wonder, therefore, that the torpedo was viewed with respect, or that its influence led to drastic modifications in both strategy and tactics.

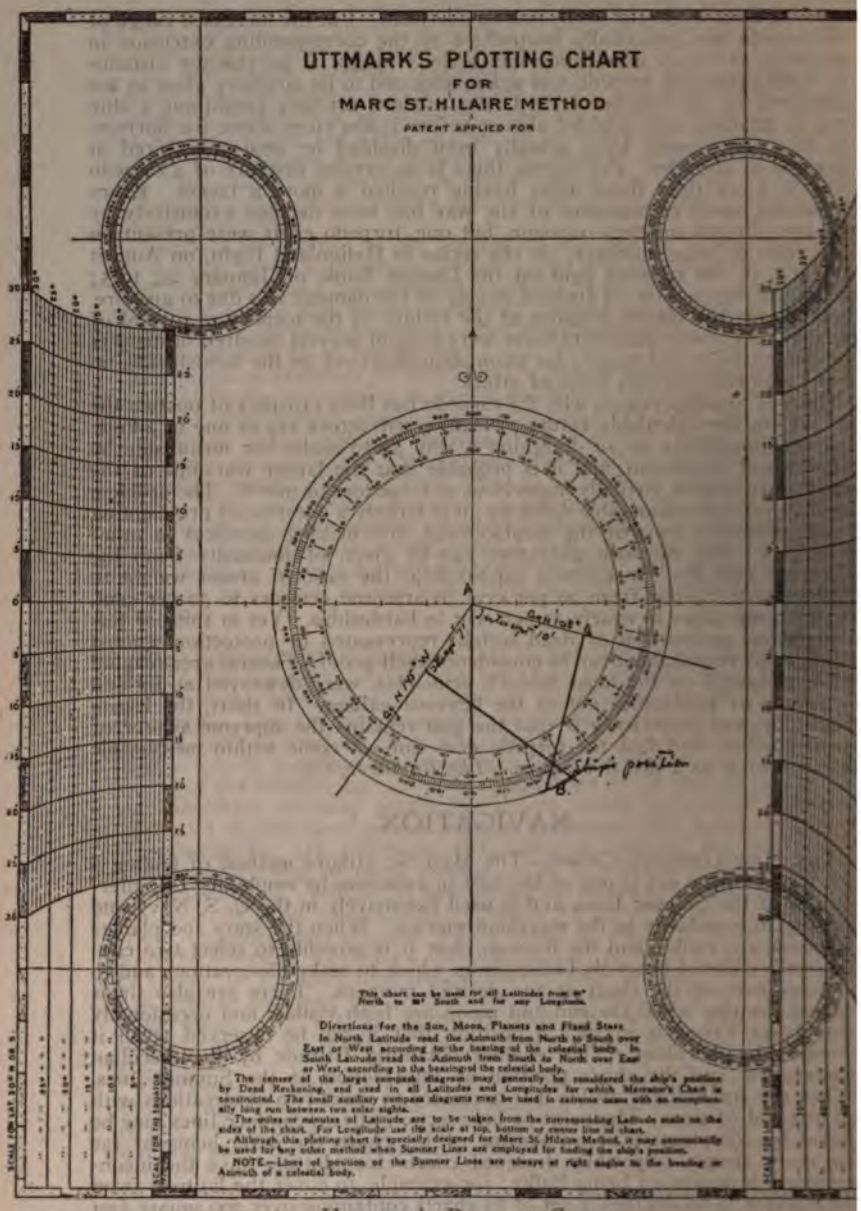
But, simultaneously with this great advance in the power of the torpedo, equally important, though less spectacular, progress was being made in the science of gunnery. Improvements, not so much in the gun itself as in sighting and control appliances, had in the course of a few years almost doubled the range at which fire could be opened with precision. Had the "decisive range" remained at 8000 yards, which was the distance most generally accepted, the torpedo would undoubtedly have been a most formidable factor, for, as its own range was well above this figure, it might have been employed with deadly effect by battleships against battleships, and shoals of torpedoes would have been racing through the water between the

opposing lines while the shells roared overhead. But the increased range of the torpedo was practically neutralized by the corresponding extension in the range of heavy guns, and, with actions fought at an average distance of 15,000 yards, the torpedo was again relegated to its auxiliary place as the armament of the smaller fry. Under modern artillery conditions a ship may be attacked and disabled almost before it has risen above the horizon. In this war vessels have actually been disabled by projectiles fired at upwards of 10 miles. *Per contra*, there is no verified instance of a torpedo fired at more than three miles having reached a moving target. Every important naval engagement of the war has been decided exclusively by gun-fire, though on each occasion, but one, torpedo craft were present on both sides in large numbers. In the action in Heligoland Bight, on August 28, 1914; in the running fight off the Dogger Bank, on January 24, 1915; and in the fleet action off Jutland, nearly all the damage was due to gun-fire. Jutland was the classic instance of the failure of the torpedo as a rival of the gun. At that engagement there were present several hundred destroyers and submarines, and targets for them abounded; yet, on the British side, no vessel was sunk by this form of attack.

There is another reason why the torpedo has little prospect of ousting the gun within the calculable future. Naval constructors are at one in admitting the possibility of so designing a ship as to make her unsinkable by under-water explosion, and it is probable that the larger warships of the near future will be virtually impervious to torpedoes or mines. The problem presents no insurmountable difficulty; it is largely a question of pre-empting a few thousand tons of the displacement, and making sacrifices in other directions. But no such guarantee can be given of immunity from the effects of gun-fire. In existing capital ships the ratio of armor weight to displacement ranges from 20 per cent in armored cruisers to 30 per cent, and in some cases to nearly 35 per cent in battleships. Yet in spite of this tremendous proportion of dead weight represented by protection against gun-fire, no vessel afloat can be considered shell-proof. Several great capital ships, armored on the most modern principles, were destroyed at Jutland by salvos of projectiles not of the heaviest caliber. In short, the lesson taught by war experience is that the gun remains the supreme arbiter of naval combat, and that the torpedo does not yet come within measurable distance of it as a decisive factor.—*The Engineer*, 1/2.

NAVIGATION

THE NEW UTTMARK CHART.—The Marc St. Hilaire method of finding a ship's position at sea is one of the best in existence by employing the intersection of the Sumner lines, and is used extensively in the U. S. Navy and gaining in popularity in the merchant marine. When the stars and planets or moon are visible and the horizon clear it is possible to select two conveniently situated heavenly bodies from which to make observations and to plot position on the chart at any desired moment. There are also times during the day when the sun and moon are both visible, and occasionally the planet Venus is in such a position that it can be observed when it crosses the meridian. This enables obtaining latitude by the meridian observation and the ship's position by intersection of the Sumner lines. When the sun alone is visible it is necessary to make two observations with an interval of time. The point of intersection of two Sumner lines may be found by computation or by plotting on the chart, the latter being by far the more simple. Specially designed charts for plotting have the inconvenience, however, of being bulky; for example, to cover the latitude from the equator to 60 degrees, a set of 12 charts containing over 200 square feet of paper have been in use for many years. This difficulty is now obviated by Uttmark's plotting chart, invented by Captain F. E. Uttmark, of Uttmark's Nautical Academy, 8 State Street, this city. This chart covers all latitudes from 60 degrees north to 60 degrees south, and all longitudes.


UTTMARK'S PLOTTING CHART
FOR
MARC ST. HILAIRE METHOD
PATENT APPLIED FOR
Ship's position
This chart can be used for all Latitudes from 80° North to 80° South and for any Longitude.
Directions for the Sun, Moon, Planets and Fixed Stars
In North Latitude read the Azimuth from North to South over East or West according to the bearing of the celestial body. In South Latitude read the Azimuth from South to North over East or West, according to the bearing of the celestial body.
The center of the large compass diagram may generally be considered the ship's position by Dead Reckoning, and used in all Latitudes and Longitudes for which Mercator's Chart is constructed. The small auxiliary compass diagrams may be used in extreme cases with an exceptionally long run between two solar sights.
The miles or minutes of Latitude are to be taken from the corresponding Latitude scale on the sides of the chart. For Longitude use the scale at top, bottom or center line of chart.
Although this plotting chart is specially designed for Marc St. Hilaire Method, it may conveniently be used for any other method when Sumner Lines are employed for finding the ship's position.
NOTE.—Lines of position or the Sumner Lines are always at right angles to the bearing or Azimuth of a celestial body.

UTTMARK'S PLOTTING CHART.

—*Marine Journal*, 4/5.

It is less than 1 square foot in area, has a scale of 6 inches to 1 degree of longitude, as compared with a scale of 4 inches to 1 degree of longitude on the former charts, and is therefore 50 per cent more efficient than the scale on the plotting chart published by the U. S. Hydrographic Office. Captain Uttmark's chart may be used for plotting ship's position by any method using the Sumner lines.

MARVELITE, A NEW ELEMENT OF SAFETY FOR SHIPS IN THE SUBMARINE ZONE.—Under present conditions at sea there are times when a light on the bridge of a ship may have fatal consequences, revealing the location of the ship to the lurking submarine. But the telegraph, the compass, the zig-zag clock and other instruments must be visible to the navigator, and heretofore lights of some sort have been absolutely necessary. This source of danger has now been overcome by the application of marvelite to the dials of these instruments. Marvelite is a luminous compound, made with radium, which makes the dials clearly readable in the dark to anyone

ALTIMETER DIAL.

WET COMPASS DIAL.

standing near them, but does not give off light enough to be seen many feet away.

It has been used for some time on clocks, watches, compasses, and by the United States Government on barometers, altimeters and other instruments of the Signal Corps and the navy.

The manufacturers of marvelite (Cold Light Manufacturing Company, 558 West 158th Street, New York) have recently solved the problem of applying their material to wet compasses, so that it resists the action of alcohol or other fluids in which the dial floats. It is also used on the dial of the log.

There are various kinds of luminous materials, but only those containing radium will stand the test of time. Marvelite is permanently luminous for all practical purposes. The Cold Light Manufacturing Company secures its radium from the Schlesinger Radium Company (its parent company), one of the largest producers of pure radium in the world; and the honor and reputation of both companies are placed squarely back of the statement that marvelite is made with radium, which is the sole source of its luminosity.

There are so many uses for this material that have not yet been developed that the company maintains an experimental laboratory for the purpose of working out problems that are presented to it.—*Marine Journal*, 4/5.

RADIO

THE UNITED STATES NAVAL COMMUNICATION SERVICE operates all radio service; 5000 youths are studying radiotelegraphy at two naval schools.—*Official Bulletin*, 30/4.

HOW U-BOATS SEND WIRELESS MESSAGES 1000 MILES.—B. H. Winfield Secor.—The Germans have developed submarine radio-communication to a fine art—they had to. This is so for obvious reasons, chief among which is that the success of the U-boat campaign depends to a large extent on keeping in wireless communication with the individual sub-sea-boats and the possibility of certain of their number transmitting intelligence to the nearest land base.

At first the submarines made use of folding or telescopic masts which did not elevate the radio antenna very far above the deck—not more than 20 to 30 feet in most cases. For ordinary inter-communication between submarines this collapsible antenna served its purpose admirably. Where long ranges were to be negotiated, either in receiving or transmitting, however, it became a real problem.

One of the latest Teutonic improvements in this arm of the naval service is the utilization of balloons for elevating the U-boats' antenna wire to a height of 1000 feet and more. In this way vast distances can be covered and valuable intelligence sent by radio to a second relay submarine if necessary, so that it is not improbable that the news of ships' sailings from American ports could have been radioed to Germany by the aid of three or four U-boats.

The balloons, two in number, and fastened to a rigid equilibrium member, carry up the antenna wire to a height of several thousand feet if necessary. The antenna, at its base, is wound on a special electric-motor driven drum. This drum is instantly controlled by the throw of a switch, so that if a ship comes into view it can rapidly reel in the balloon antenna and the balloons are taken inside, hatches closed and the craft submerged—all in almost less time than it takes to tell about it. It is difficult for an enemy ship to see the balloons, as they are cleverly camouflaged, being painted partly white and partly blue, so that against the sky they are practically invisible. The antenna wire is, of course, quite fine and invisible at even a short distance away.

It has been a mooted question for some time as to just how far such a radio-equipped sub-sea fighter could send a message. The receiving range with such a balloon suspended aerial is easily several thousand miles, using modern amplifiers and other refinements in the radio art. The writer asked several well-known radio experts their opinion on the possible sending and receiving activity of a balloon-aerial equipped U-boat and they practically all agreed with the ideas expressed by Mr. F. H. Kroger, chief engineer of one of the leading American radio companies, that, with fair weather conditions, and with the proper radio transmitting apparatus tuned to a high wave length, it would be possible for the submarine to send a wireless message 2000 miles, and possibly 3000 to 4000 miles under extremely favorable conditions. The transmitting set used might, of course, be a special one rated at 15 to 25 kilowatts.

If the sub-sea-boat wanted to transmit an important message she would in all likelihood choose the night-time. She could then emerge and fly her balloon aerial with reasonable safety. And for a long-range message requiring as much energy as mentioned above, it should be remembered that there is available all the engine power required. All that would have to be done would be to connect up the high capacity dynamo to these engines, and this in turn to the special high-power radio transmitter. Such a set, including the dynamo, would not occupy such a large space as might be imagined off-hand. Also the newer U-boats are vertiable submarine-cruisers, several hundred feet in length, which, of course, gives a much greater space for the radio equipment.

Many ingenious folding and other types of masts have been perfected for medium and short-range radio work on the submarine. An interesting practical telescope mast was patented by a Yankee inventor several years ago. The inventor, Mr. Joseph Raes, covered several modifications of the basic idea in his patent. In one type a continuous flexible metal cable is used. When a pull, as produced by a motor, is applied to the lower end of the cable, it causes all of the sliding telescopic members to be elevated. The upper end of the cable is secured to the bottom of the top telescopic member. When pressure is removed on the cable the mast descends by gravity.

A similar type telescopic mast has the individual sections raised and lowered by a clever arrangement of gears and shafts. This elevating scheme would be considerably slower than the pervious cable-operated type.

The author suggests herewith a pneumatic telescopic radio mast. This is similar in principle to the pneumatic (compressed air) lifting cranes used in manufacturing plants, foundries, etc. With the proper pressure of compressed air, it is only necessary to close the suction blower pipe valve, open the high pressure air valve attached to the pipe line from compressed air tank or flasks, and the mast rises up by expansion of the air within it. When it is desired to lower the mast quickly, the compressed air valve is closed and the suction blower line valve slowly opened; the air is thus removed and the mast collapsed. Ordinarily, no suction would be required to lower the mast; merely a valve opening to the atmosphere through which the compressed air could rush to the outer air.

An ingenious collapsible radio mast was invented in Germany some years ago, and several of them have been used in this country. It was, perhaps, the lightest ever designed thus far—possibly too light for submarine requirements—but it possessed the element of speed. It employed four flexible strips of metal rolled on drums at the base. These strips were notched on both edges, and when the handle was turned the four notched strips of thin steel intermeshed with each other, making a lock-cornered square tubular mast about 8 inches square. It was found possible to raise a platform containing two men on it to a height of 80 feet for observation purposes when necessary. Two men could raise the mast in a short time by turning a geared crank handle.

An interesting feature not generally known is that submarines are now fitted with submarine telegraph apparatus, which operates by means of sound waves sent through the water from powerful electric vibrators mounted on the hull of the submarine. Sensitive microphones suitably mounted on either side of the hull enable the commander to tell when a ship is approaching, even at a considerable distance, by the sound of her propellers, which is transmitted through the water.

Then there is the latest safety feature—the telephone buoy. If the submarine should sink and become unmanageable, the crew can pull a lever which releases the telephone buoy, which rises to the surface of the water. Any craft passing in the vicinity of the sunken sub-sea-boat can open this buoy and, by means of the telephone inside it, speak to the imprisoned crew. Submarines send out sound signals of distress through the water also, which may be intercepted by another or by a warship or steamer.—*Electrical Experimenter Magazine.—Baltimore Sun*, 28/4.

ENGINEERING

ELECTRIC WELDING IN PLACE OF RIVETING.—The proposal to use electric welding in place of rivets in securing the plating of a ship, is an attractive proposition if it can be done successfully, and we understand that tests which were recently made in the presence of the representatives of the Shipping Board have been so satisfactory that one of the engineers of the Emergency Fleet Corporation has been sent to Newark where the system

is to be tried on the 9500-ton ship which is about to be built by the Federal Ship Building Corporation of Newark, N. J. According to the dispatch, a low voltage is used and the current is applied to the metal through the ends of large forceps which press the sheets firmly together after the metal has become sufficiently heated to effect a weld.—*Scientific American*, 27/4.

METHOD OF TESTING LUBRICATING OILS.—Although it may not be possible to give an exact definition of the lubricating power of an oil nor to attempt to employ a method for measuring this important property, it is found that it is directly connected with viscosity. It is well known that the viscosity of liquids can be observed by the Poiseuille method, by measuring the rate of flow through a capillary tube, and making use of a suitable formula which takes account of the quantity of liquid delivered per unit of time, the radius of the section, length of the tube, and pressure on the oil, whence is obtained a coefficient representing the viscosity. This latter decreases rapidly as the temperature rises. In practice, comparison is made of the viscosity of the product under observation with standard types of oils by passing the oil through a tube at the same pressure and measuring the flow. It is of interest to make such tests at different temperatures, for in the case of an oil whose viscosity decreases too quickly when the temperature rises, there is danger that it will cease to lubricate when heating occurs.

At a recent meeting of the French Physical Society, M. René Dubrisay proposed a simple device for making tests upon lubricating oils, and it gives sufficiently exact results. He makes use of a pipette containing an upper and a lower bulb of about 2 c. c. each, joined by a straight portion. A short piece of tube projects above the upper bulb, upon which is fitted a piece of rubber tube with a pinch cock. Below the lower bulb is also a short length of tube for outflow of liquid. Near the rubber tube is an upper mark, A, and between the two bulbs the marks B and C. The pipette is plunged in oil and taken up full, the upper surface of the oil being made to coincide with the top mark A; the filled pipette is then dipped into a vessel of water and left until the temperature reaches an equilibrium. Then the pipette is held by means of a support so as to bring the lower mark C at the level of the surface of the water, and the cock is opened so as to let the oil flow out. The time in seconds is counted which is taken for the oil to descend from A to B. As the variations in density between different oils are slight, the pressures of flow are practically the same in all cases. Again, the temperature can be closely measured, and it is an easy matter to operate with a series of temperatures throughout a wide range.

The method has the following advantages: The outflow from the end is always visible. A uniform temperature is obtained in the whole mass at the start, and this does not vary appreciably during the experiment. However, it may be asked, since the outflow takes place in water, whether the results are comparable with those usually obtained, and whether the present measurements of viscosity have a practical value. But the author made a series of tests upon a number of common lubricating oils, first with the classical Barbey apparatus and then with the present simple method. The curves obtained in the two cases have practically the same appearance, and in both methods the oils are classified in the same order. From these tests, the value of the author's method appears to be established. One practical point to be noted is that the new device can be used to find out at what temperature the oil ceases to flow, under a uniform pressure, and this test will be of value in the case of oils which are used in cold weather for lubrication of mechanical parts working in the open air.—*Scientific American*, 27/4.

ENGINEERING RESEARCH ON AIR PUMPS BY THE NORTH-EAST COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS.—The important departure by the North-East Coast Institution of Engineers and Shipbuilders in ap-

nting a committee of expert engineers to test apparatus offered by manu-
turers and accepted by the Council has resulted in a very comprehensive
ort on the working of air pumps such as are used in connection with the
denser plant of steam engines. The manufacturers in this case were
ssrs. Richardsons, Westgarth and Co., Ltd., and the tests were carried
at their Hartlepool works.

The report, presenting as it does authoritative and reliable data, should
ve of great value to engineers, especially with reference to the produc-
n of high vacuum for steam turbines and to the more economical pro-
tion of low vacuum for cargo vessels; it definitely marks the opening
by a scientific institution of a new and most valuable field of activity,
l there can be little doubt that the example which the North-East Coast
titution has set will be followed in other parts of the country, so that,
mately, organized scientific research in engineering and other branches
industry will become active and general instead of, as at present, pas-
e and exceptional.

The investigations undertaken by the Institution will include air pumps
the reciprocating type and of the rotary and jet types. The present
ort deals with tests made on pumps of the reciprocating type only, and
point of chief technical interest is the fact that the tests have demon-
ated that remarkable influence in the withdrawal of air from a con-
ser is possessed by a steam jet or a series of jets when used in com-
ation with such pumps. The original conception of combining a steam
with an air pump was due to Mr. James Atkinson, of London, who in
6 proposed it in connection with the cooling of liquids under high
uum. In 1902 it was developed by Sir Charles Parsons in his vacuum
mentor for use with steam engine condensers, and at later dates has
n further considerably improved by Mr. D. B. Morison, of Hartlepool.
ese improvements, known as the kinetic system, are dealt with in the
ort, together with the "wet and dry" and other systems now in gen-
l use.

Special attention has been given to air pumps and condensers in recent
rs, which is primarily due to the influence of vacuum on the steam
nomy of turbines, an influence which is greater than is generally real-
l. For example, in the case of high-pressure turbines an increase in
uum from 27 inches to 29 inches results, in a suitably designed turbine,
gain in steam economy of 13 per cent, and in the case of exhaust steam
bines the same increase effects a possible saving of no less than 22
cent.

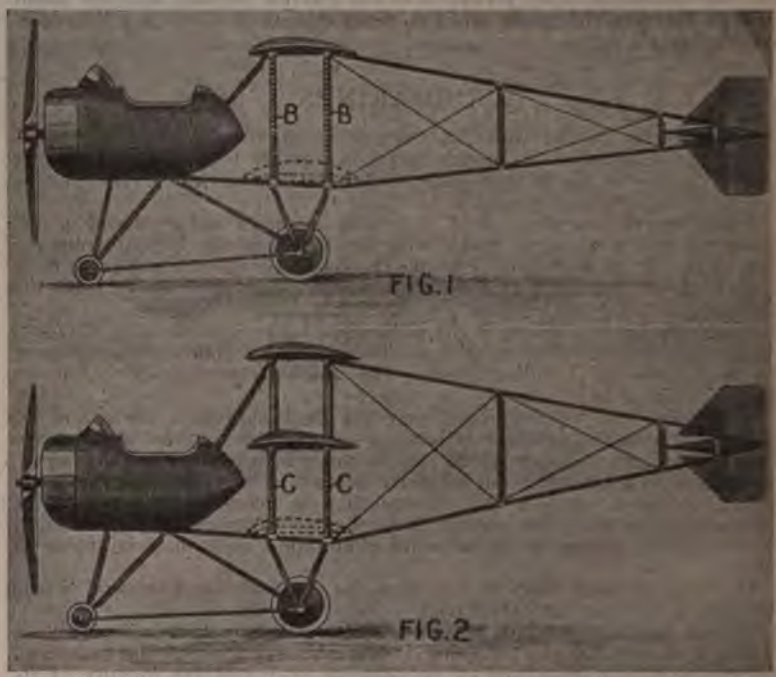
According to present practice, there are many ways of withdrawing air
m a condenser, as by reciprocating and rotary pumps and by steam and
er ejectors, but in view of the general adoption of geared turbines for
mercantile marine as soon as conditions permit, authentic tests on any
aratus for the production of high vacuum which is so essential for the
nomy and efficiency of this system of marine propulsion, are of un-
al value at the present time.

From a technical standpoint, the report demonstrates beyond question
t no mechanical contrivance is so simple and so efficient as a steam jet
compressing a large volume of highly attenuated air through a small
ree of compression, and, as is already well known to engineers, a re-
ocating air pump is a very efficient means for discharging moderate
umes under a high degree of compression. Consequently, the correct
ution of the problem of air discharge from a condenser is to withdraw
rge volume of aerated vapor by means of one or more steam jets and
press it through the range of compression in which the steam jet
rks with very high economy and then pass it on at such an absolute
ssure that an air pump or other device can discharge it to the atmos-
re also with very high economy.

It is interesting to note that mainly with the production of high vacuum
h as is required for steam turbines, the report makes it clear that, for

planes, thereby transforming a triplane into a biplane. In both these instances the closing of the plane is brought about by revolving the interplane struts, which struts are shown at *B* and at *C*.

The interplane struts in Mr. Hammond's plans are threaded with a screw thread for their whole length in the case of the biplane machine. In the triplane the screwed interplane struts are threaded on their lower halves, the screwed struts passing through sockets in the collapsible planes. It will be obvious that when the threaded interplane struts are revolved by any



SCHEMATIC PLANS FOR CONVERTING A BIPLANE INTO A MONOPLANE AND A TRIPLANE INTO A BIPLANE WHILE IN FLIGHT SO AS TO INCREASE SPEED.

suitable means, the collapsible plane or planes will be lowered or raised in accordance with the direction of motion of the operating gear.—*Scientific American*, 4/5.

THE POWER PLANT FOR ALTITUDE FLYING.—By E. H. Sherbondy.—One of the most important strategic phases of the war to-day has become the destruction of enemy military and naval bases, systems of transportation, bridges, etc.

We all know that the only one thing that could have prevented the Germans from carrying out or continuing the recent drive would have been the destruction of the bridges on the Rhine.

To destroy the bridges on the Rhine means bombing those bridges during the daytime. To do this means going over hundreds of miles of embattled forces, hostile aeroplanes, and anti-aircraft guns.

The only way to reach the Rhine bridges is to do what the Germans have done, to some extent, in bombing London and Paris during the past year.

They flew at such a great height that they were not detected until they came down over London and Paris and dropped their bombs.

We must now think in terms of rising to heights over 25,000 feet, so as to pass the enemy's lines and over the enemy's aerial patrols undetected.

Flying at altitudes of over 25,000 feet can only be done by producing a motor capable of giving sufficient power to climb above these altitudes. This may be carried out in two ways:

(1) By developing a fuel impregnated with the oxygen required for combustion.

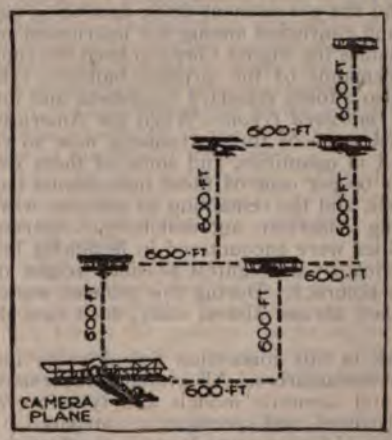
(2) By pre-compressing the air required for combustion so as to have the same number of pounds of oxygen available for combustion that are available at sea level.

The Aircraft of the Near Future Will Have Two Power Plants for Altitude Work.—The aircraft of the future will have two power plants for altitude work, one of which will be adapted and suitable for operation up to 20,000 feet altitude, and the second will be designed specifically to operate in rarified air which is encountered at altitudes above 20,000 feet.

The Resistance to Movement is Greatly Reduced at High Altitudes.—The revolutionary German long distance super-gun, which is reported as firing a projectile 60 to 70 miles, accomplishes this result by firing at a high angle, so that the trajectory is a hyperbole, whose zenith is in the neighborhood of over 15 miles above the sea level. The density of the air above 50,000 feet is sensibly constant up to 200,000 feet and the absolute pressure is in the neighborhood of 1.4 pounds per square inch.

Hence the density of this air is reduced to about one-tenth of the atmospherical pressure at the sea level. The resistance to movement in this highly rarified air is greatly reduced. As a consequence, the possible velocity of the projectile is immensely increased over that of a projectile fired on a flat trajectory.

The same would be true in aeroplanes, provided the power did not decrease as a function of the density of the air. As an actual matter of fact, the speed of aeroplanes, instead of increasing with increasing altitudes where the resistances met with are reduced, they decrease in power and speed because of a lack of oxygen available for combustion to provide the motive forces.—*Flying*, May.



HOW FIGHTING AIR PATROL LINES UP.

The V-formation, with the camera machine in front and below, the five protecting planes above and behind it.

—*Baltimore Evening Sun*, 25/4.

THE DELICATE NAVIGATING INSTRUMENTS USED BY AVIATORS AND HOW THEY ARE BEING SUPPLIED TO THE SIGNAL CORPS.—The Signal Corps authorizes the following:

Before an airplane can be put into military service it must be equipped with nine or more delicate aeronautic instruments, some of which are absolutely essential to exact flying, and all of which contribute to the successful operation of a plane. Without them a pilot would soon lose his location as to height and direction; he would not know his speed through the air, the speed of his propeller, the amount of gasoline in his tank, the temperature of his cooling water, or if his oil was circulating. He could not tell whether he was banking properly on his turns. These comprise the necessary flying instruments, but an aviator could not fly to any great height without another valuable instrument, an oxygen-supplying apparatus, nor could he operate his guns, signal headquarters, release his bombs, or "shoot" his cameras without additional mechanisms.

Two Sets Sometimes Necessary.—All these instruments must be ready for installation on the airplanes as soon as they are assembled, for no plane is complete without them. In some instances, particularly for the two seaters and the heavy bombing machines, two and even three instruments of each sort are necessary, totaling sometimes as many as 23, but for ordinary work only about 9 of them are needed. The average cost of a set of navigation instruments for a single plane is $350.

For operation of actual combat planes, such as observing, photographing, bombing, and fighting planes, many other complicated and expensive instruments and sets of apparatus are necessary. Among them are machine guns, gun mounts, synchronizers, bomb racks, bomb-dropping devices, bomb sights, radio, photographic, and oxygen apparatus, electrically-heated clothing, lights and flares. The cost of such additional accessories would bring the total cost of equipment for a plane to several thousand dollars each, depending upon the type of plane. But these devices will not be discussed in detail here.

One Purchasing Center.—The Signal Corps is purchasing practically all the purely navigating instruments and selling them at cost to the manufacturers of the airplanes as they are needed to meet the actual output of planes. This provides one purchasing center and prevents the various airplane companies and the government from competing against one another, creating disorder and confusion among the instrument manufacturers. At the same time it enables the Signal Corps to keep the supply of instruments adequate for the demands of the airplane builders, relieving them from this work, and it also affords standard equipment and interchangeability.

Foreign Models Improved Upon.—When the American air program began to be developed, none of the instruments now so vital to the service was being produced in quantities, and some of them were not being produced at all. Over 60 per cent of these instruments had to be developed from foreign models, and the remaining 40 per cent was secured by modifying or remodeling American automobile-type instruments. Numerous and serious difficulties were encountered in designing instruments, capable of quantity production, of the lightest possible weight and under exacting requirements as to accuracy. During this pioneer work, new instruments were being developed abroad almost daily, each new design carrying an improvement.

Most of the work in this connection was done by the Signal Corps in conjunction with manufacturers. All available information and data were collected, foreign and domestic models and types were carefully tested, designs were standardized, and specifications prepared. Results show that types for every class of instruments have been adopted and put into production here. Far greater standardization has been reached than exists in Europe to-day, tending to increase quantity production materially and decrease the number of replacement parts necessary.

New Sources of Supply.—Quantity production on the scale necessary demanded the enlargement of all existing sources of supply and the creation of many new plants and factories. A certain amount of time was available before it was necessary to use these instruments on planes in service—the planes themselves had to be built. Accordingly, orders were placed from three to eight months ahead of requirements, but only in such quantities as would insure a steady production, owing to the certainty of improvements in the various designs.

The early plans of the production department have developed from two to five sources for each instrument, established both as a safety measure and as a means of placing future orders on a strictly competitive basis.

Some of the Instruments.—Various instruments developed by the Signal Corps include:

The *tachometer,* or revolution counter, is an instrument which indicates the number of revolutions per minute at which the engine is running. Unlike the speedometer on an automobile, it does not translate revolutions into miles per hour; another instrument gives the speed in relation to the air. When instrument matters were taken up last July there were no tachometers manufactured in this country of the type which has proven most successful abroad; namely, the escapement or chromatic type. Two large manufacturing companies are now turning out these instruments in large quantities, one of them 100 a day, and a third company has also in production a new centrifugal type.

The Air Speed Indicator.—The *air speed indicator* is a pressure gauge for showing the speed of the plane in relation to the air, not the earth. This instrument includes what is known as a Venturi-Pitot tube, which is fastened to a strut and takes in the air from ahead. The air sets up a corresponding pressure in an auxiliary tube, which is calibrated and indicated on a dashboard recording pressure gauge.

The altimeter is an aneroid barometer, graduated to read height above the earth instead of pressure. Under standard specifications a reduction in weight and size was effected in the manufacture of these instruments, which are now being produced in large quantities and of a quality equal to the best foreign make. Three standard types are made, with ranges of 20,000, 25,000 and 30,000 feet. Production was up to 500 a week in April.

The Aeroplane Compass.—The airplane compass.—After much experimental work, this instrument has not yet reached the perfection desired. A new type, having advantages over any present form of compass, especially as to compactness, is now used. In the development of this instrument, effort has been made to reduce the weight to the safest possible minimum and to decrease the space required in the airplane. One concern is now turning out compasses at the rate of 200 a week.

Airplane clocks.—Due to the development which had been made in clocks for automobiles, it was only necessary to standardize a design of mounting in order to adopt such clocks to airplanes. Sufficient quantities are now available for all needs.

Pressure gauges.—Instrument-board pressure gauges were already manufactured here in large quantities, and as soon as standard specifications were developed, production started. Two types are used, one to register the air pressure which forces the gasoline to the engine and the other to show the pressure produced in the oiling system by the oil-circulating pump. Standard forms of cases and dials with interchangeable glasses and bezels have been designed.

The Radiator Thermometer.—Radiator thermometer.—This instrument is mounted on the instrument board, where it indicates the temperature of the cooling water in the engine. Undue heating shows that the engine is not running properly or that more water is needed. Thermometers of this type made here were, and still are, being submitted to extensive tests. Efforts were also made to stimulate the trade toward developing more

accurate and reliable instruments, and now a sufficient supply is available from two sources.

Banking indicator.—This is an instrument used to show when a plane is correctly banked in making a turn. Spirit level, balance, and gyroscopic types are being used. The problem of indicating the extent to which a plane is inclined to the horizontal in the air is a very complicated one. No simple solution has yet been reached. Fortunately, it is not often necessary to determine whether the plane is exactly horizontal, except in connection with bomb dropping. Development work is under way which it is hoped will lead to improvement of devices already in use abroad.

Aldis sight.—This sight, which is used in connection with fixed guns firing through the propeller, has been copied, as regards its optical features, from an English instrument; but the construction has been modified in such a way that the behavior of the instrument in actual use will probably be very much improved. After a number of tests and experiments satisfactory instruments are now available. The makers have been assisted in recomputing the lenses to suit the optical glass available in this country. The illumination of these sights for night operation is also being studied.

Standardization of Parts.—Standardization in connection with the design of the above instruments has been found possible, without delaying production to a much greater extent than has been done abroad. In this way the number of necessary replacement of parts has been considerably reduced, and a uniform type of dial has been adopted which, as to legibility, will be equal to the best that has so far been used. All finished instruments are carefully tested before being mounted on the planes.

Among other things, safety belts for pilots, observers and gunners have been designed and are now in production; radio and photographic apparatus, ordnance devices and oxygen apparatus have also been developed and put in course of manufacture.—*Official Bulletin*, 7/5.

UNDERGROUND HANGARS OF THE GERMAN AIRMEN.—These are unhappy days for the German flying men. Not only are they confronted by overwhelming numbers when they take to the higher altitudes, but even when resting in their shelters many miles from the battle front they are subjected to the attacks of enemy airmen.

Almost four years of continuous warfare has disclosed the fact that the German is not slow to put new ideas into execution. So it is not surprising to hear that the German airmen have resorted to the same device as their brothers in the first-line trenches, namely, underground shelters and hangars as a protection against hostile attacks. It is learned from allied intelligence officers that at many points on the western front the enemy is busily engaged in building underground hangars and quarters. And this, after all, is nothing more than carrying out their program of wonderful subterranean shelters on a far greater scale than heretofore attempted by the infantry.

It appears that the Germans are excavating roomy caves below the surface, which they roof over with a heavy layer of sandbags and the original sod. The roof is supported by pillars at frequent intervals so arranged as to interfere the least possible with the movement of the airplanes. From the entrance of the underground hangar there extends to the surface an inclined runway of concrete, which can be used most admirably in starting a flight; indeed, no matter what may be the condition of the surrounding terrain due to rain or snow, the concrete runway is always ready for service. As likely as not the Germans are using or will use large strips of canvas painted the same color as the surrounding grass, to camouflage the concrete runway and the entrance to the hangar. While speaking of camouflage, it is also well to mention that they intend using decoy or dummy aerodromes some distance away from the underground hangars in order to draw off enemy attacks from the real objective.

It would be a case of sheer ignorance to deride this latest German idea, for in many respects it has marked advantages, particularly from the German point of view when the allied aviators are nightly attacking the German airmen at their camps. Furthermore, it is not infrequent for a severe wind storm to cause considerable damage to the usual aerodrome. Obviously, an underground hangar, if properly built and waterproofed so as to avoid excessive dampness which would certainly prove most harmful to the airplanes and other equipment, ought to be one solution of the housing problem.—*Scientific American*, 4/5.

MERCHANT MARINE

CONCRETE SHIP "FAITH" HAS TRIAL.—The 7900-ton steamer *Faith*, the largest concrete ship in the world, built by the San Francisco Shipbuilding Company, had a successful trial trip last week, averaging more than 11 knots an hour in its four trips over the official trail course. The *Faith's* engines were installed in 44 days, it being a local record. The success of the trip will result in the construction of three more concrete boats, each larger than the *Faith*, at Redwood City by the same company.—*Nautical Gazette*, 11/5.

ELECTRICITY TO RUN SHIP.—*Biggest Vessel of Its Kind in the World Has Just Been Built in England.*—London, May 6.—The biggest electrically-propelled ship in the world has just been built in England. It will be operated like a street car and will have 10 per cent more cargo space than a coal fuel ship of the same tonnage.—*The Star*, 6/5.

CONTRACTS TO BUILD 5 NON-SINKABLE SHIPS.—The Foundation Company of this city, through Franklin Remington, its president, announced yesterday that it has received from an unnamed government the contract for the construction of five steel ships of a new and supposedly non-sinkable type. The vessels are to be constructed within a year at a site near New Orleans just acquired by the company and now in the process of transformation as a shipyard.

"Naval architects in this country and abroad have worked out hundreds of designs for so-called non-sinkable ships, but few, if any, have been developed beyond the theoretical stage," said Mr. Remington. "In this case, however, an experimental boat was built and tested with results so satisfactory that the government interested has authorized the building of five vessels of this type. They will be of 42,000 tons dead weight and will have oil-burning engines."

These vessels, it is asserted, will be virtually submarine-proof. Tests of an experimental ship combining identical features have led naval architects to the belief that the new type of vessel will do all that was claimed for it, the company officials say.

The hull consists of two parallel cylinder shells joined throughout their length by a series of heavy-braced diaphragms. The ability to resist submarine attack, it is said, depends upon the improbability of the vessel being struck by torpedoes on both sides. Each cylindrical shell is not only divided into water-tight compartments by transverse bulkheads, but entirely isolated both from the adjoining shell and from the sealed space between the two. The latter space, it was explained, has a water-tight bottom and deck and is not used for cargo, but is provided solely for reserve buoyancy.

Claim is made for the new type by the Foundation Company that the proportions of the ship are such that it will not sink even though all the compartments on one side are flooded. An added advantage, the statement says, is that the vessels ride so low in the water that their visibility is reduced and they do not furnish a fair target for gun-fire.

Another new feature of the "non-sinkable" vessels is that they are equipped with separate unit engines, and in case one set is put out of use, the other set can carry the disabled craft to port.

Defence guns will be mounted above the fore and aft deck houses. These latter will be the quarters of the crew and will be connected, for safety in rough weather, by way of the reserve buoyancy space.

It is expected that the first of the five vessels will be launched early next year, and the first completed vessel will be ready for her maiden trip across the Atlantic in April, 1919.

The American patents for this type of ship are controlled by a New York firm of engineers, of which Joseph Boero is president. It was through this firm that the Foundation Company obtained a contract for the first steamers to be built. This is the third order which the Foundation Company has received from the government in question, and brings the number of ships under contract up to 83. In addition to this, the Foundation Company is building vessels for the United States and for other allied governments.—*N. Y. Times*, 28/4.

THE DIESEL ENGINE-DRIVEN CARGO VESSEL.—Calling attention to the progress which is being made in the development of the internal combustion engine of low power for fitting in auxiliary vessels, *Shipbuilding and Shipping Record* remarks that, despite the undoubted economy possessed by these vessels, British shipbuilders and shipowners have a deep-rooted preference for the cargo vessel without sails. It is necessary now to consider why it is that the internal-combustion engine of moderate power is not yet considered a suitable machine for the propelling of cargo vessels of moderate size and power. These vessels form the bulk of our merchant fleet, and it can be asserted that if a thoroughly reliable Diesel engine of about 2000 horsepower could be designed, such as would propel a vessel of 300-foot length at a speed of about 11 knots, the demand for such an engine would be very great indeed. Two main objections have been advanced against the adoption of this type of engine; first, that it is dependent upon the supply of a fuel which comes from abroad, and, secondly, that the Diesel engine has not yet reached the same state of reliability as the reciprocating steam engine of the same power. The chief objection is undoubtedly the latter. There are many services in the course of which vessels could obtain adequate supplies of fuel oil at very cheap rates, and yet vessels for these services are still built which are propelled by steam engines, although oil fuel boilers are often employed. When it is remembered that the employment of the same oil in a Diesel engine would result in an approximate halving of the fuel bill, the advantage of adopting this type of engine is apparent, always provided that an equally reliable engine can be obtained. The United States Shipping Board is constructing a number of standard oil tankers, and yet these vessels are all propelled by steam engines. It would appear, therefore, that the main problem is one of designing a reliable type of internal-combustion engine.

The war must be held responsible in a very large measure for retarding the progress of the Diesel engine, especially as far as the British-built engine is concerned. There have been a few of the well-known continental firms who have built a special type of Diesel engines, such as Burmeister and Wain, Sulzer Bros., and Schneider, and there have been British engineering firms who have taken up the construction of Diesel engines of the pattern produced by one or other of these continental firms, introducing, perhaps, improvements of their own, but we still await greater initiative on the part of British engineers to design particular types of oil engines of their own. Of the engines built in this country, little working data are available. They all, of course, showed the great economy of fuel consumption which makes the Diesel engine so efficient a form of prime mover, and thereby compels designers to continue to attack the problem of the production of engines of this type, but from the point of view

of reliability, freedom from breakdown, and cost of construction, maintenance and repairs, they all left very much to be desired. Doubtless improvements are being made which tend to increase the reliability of these engines, and but for the war a far greater amount of attention would have been given to the problem so that progress would doubtless have been more rapid than it has actually been.—*Nautical Gazette*, 2/5.

STANDARD SHIP DESIGN.—*Owners' Comments on a New Type.*—(From our Shipping Correspondent.)—It seems likely that shipowners may press for a little more information respecting the "N" type of fabricated standard ship which was recently described by the First Lord in the House of Commons. This particular type, the First Lord explained, was "designed by the Admiralty in the Department of the Director of Naval Construction in close consultation with the Department of the Controller" and, giving some details, he said: "Comparing this type with the type 'A,' which was the original design, we get 2470 tons additional deadweight capacity for an extra 11½ feet in length. Each ton of net steel in the new type will yield 4.06 deadweight tons, against 3.53 tons for each ton of net steel in the original type, an increase of carrying capacity of 15 per cent for each ton of steel. Not, I think, a bad result for these experts branded as amateurs!"

Owners quite recognize that, without adding much to the length of a ship but by increasing the beam and depth, the deadweight-carrying capacity could be raised. But they point to the existence of a danger that such a vessel would not have space for the stowage of sufficient ordinary cargo to put her down to her marks—*i. e.*, to enable her to carry her full weight. Alternatively, it is argued that if a cargo of sufficient density were found to enable the ship to carry her full deadweight, then the question of her suitability for heavy weather would arise. The theoretical gain in the carrying capacity of such a vessel would, they maintain, in practice be likely to be lost.

While owners will gladly give full credit to any ingenuity which is proved to be effective in stimulating the rapid production of tonnage, it is not unnatural that they should view somewhat critically departures from established and successful forms of design. It is they who, together with the shipbuilders of the country, were responsible for maintaining the supremacy of the British mercantile marine before the war, and they would be loth to accept any suggestion that they did not select the most suitable forms of design. Further, it is pointed out that the "A" class of standard ship, with which the "N" type is compared, was the result of "deliberations of high shipping and shipbuilding authorities."—*London Times*, 15/4.

WORLD'S SPEED RECORD MADE IN BUILDING STEEL COLLIER.—*New York Company Completes 5500-Ton Steamship in 27 Days.*—The United States Shipping Board authorizes the following:

The steel collier *Tuckahoe* was launched from the Camden ways of the New York Shipbuilding Co. at 10.30 o'clock Sunday forenoon, thereby establishing a world's record in rapid ship construction.

The record was 27 days, 2 hours, and 50 minutes. This means that within that period a 5550-ton steel steamship was built from keel to truck and launched practically complete in every detail—boilers in place, engines installed, masts stepped, funnel in place, propeller fitted, rudder hung, and only finishing touches to be put on.

Forty-one Days Ahead of Time.—The *Tuckahoe* was to have been delivered on June 15. The company, therefore, got her out 41 days ahead of time.

The vessel has a length of 330 feet, a beam of 50 feet, and will be endowed with a speed of 10½ knots.

This accomplishment of building a steel steamship of this bulk in a fraction more than 27 days is one of the marvels of the day. It surpasses

any record hitherto made in any shipyard of the world. The best record of any British shipyard is said to be about two and a half months. Previous to our entrance into the war American shipyards had not outstripped British competitors in the rapid construction of merchant tonnage.

The *Tuckahoe* was christened by Miss Helen Hurley, the young daughter of the chairman of the shipping board.

Chairman Hurley, who made a congratulatory address to the shipbuilders, read the following letter from President Wilson:

The President's Letter.—The White House, Washington, May 3, 1918. To the Workmen and Executive Staff of the New York Shipbuilding Company, Camden, N. J.: My Dear Friends: I want to congratulate you on the extraordinary record you have made in your work on the steamship *Tuckahoe*. I wish I could be present in person to express to you the feeling that I have that we are all comrades in a great enterprise and that you have played your part with extraordinary devotion and skill, eliciting not only my admiration, but I am sure the admiration of all who will learn of what you have accomplished. I congratulate you and bid you Godspeed.

Cordially and sincerely yours,

WOODROW WILSON.

—*Official Bulletin*, 6/5.

WHAT DO YOU MEAN BY "A MILLION TONS OF SHIPPING?"—Recently the Germans announced that in a certain period they had destroyed a million tons of British shipping. London countered with the reply that the actual tonnage was less than 500,000.

Yet both statements were true, and, indeed, they were identical, save that they refer to different kinds of tons.

Let us examine this matter of tonnage calculation and endeavor to present the facts so that a layman will readily understand the figures. What the average American wants to know is how many tons of supplies a vessel will deliver in Europe, and we cannot recall that we have ever seen an official statement which calculated in that simple sort of unit.

When we hear the word "ton" we are inclined to think of 2000 pounds. Alas, before we can understand this subject we must rid ourselves of the simple arithmetical rules of childhood and face the fact that there are at least four utterly different meanings to the word "ton" as used in the shipping trade, and that while in two of these cases the word refers to a matter of weight, in the other two it relates to a measurement in cubic feet and has no concern whatever with weight. Finally, you must know that even after you understand the four meanings of "ton," that doesn't greatly help you to find out how much cargo a vessel will carry.

There is an obvious reason for using one system of measurement for fighting ships and another for cargo vessels. In the latter case we want to know how much freight can be carried, while in the former there is no such thing as freight.

Therefore, naval vessels are usually measured by "displacement." When we say, for example, that the dreadnought *New York* is of 27,000 tons, we mean simply that she *weighs* 27,000 tons. And since she "displaces" water equal to her own weight, we are accustomed to say that she has a displacement of 27,000 tons.

When we come to merchant vessels, the complications begin. First we say, for example, that the shipping board hopes to turn out in 1918 vessels of 6,000,000 *deadweight* tons. What this really means is that if we should take all these vessels at one time, absolutely new and empty, and if we should put on board their crews, fuel, the consumable stores, and supplies of all sorts, and should then put cargo on board them until they were carrying the maximum amount with which they could safely go to sea, then the weight of all these various things, from crews to cargo inclusive, carried by these ships would be 6,000,000 tons. The *total* deadweight

(and liveweight) they will safely hold is 6,000,000 tons. Obviously this does not mean that these ships can take 6,000,000 tons of cargo.

The British Government gives out a weekly statement that so many tons have been destroyed by submarines. These are *gross* tons, and have no relation whatever to weight. To understand what a "gross" ton is, one must realize the reason for this sort of measurement. You are interested in knowing how many tons a ship will carry. Now, clearly, she will carry more tons of iron than she will of loosely-packed feathers. In other words, the bulk of the freight—its cubic content—has something to do with the quantity the ship will carry. So it became usual to calculate the bulk of various packages of freight, and then to measure the inside of the ship and so find out how many of such packages she would carry. It would have been simpler if we had just measured the vessel and said that she would hold a bulk of so many hundred cubic feet. But we didn't. We took the over-worked word "ton" and said: "We won't use the expression 'one hundred cubic feet,' but 'one ton,' and we will mean exactly the same thing."

Now, ridding ourselves, for the sake of simplicity, of certain arbitrary legal rules as to how you shall measure and between what points, it is correct to say that when we speak of *gross* tons we are referring to the inside measurements of the cubic volume of the ship. For example, the ordinary office room or living room contains about 3000 cubic feet of air. It has, therefore, in the language of the merchant service, a measurement of 30 gross tons. If we take the ship, new, and with her deck houses and enclosed spaces complete, and if we measure her on the inside and find that she holds 1,000,000 cubic feet of air, then we say she is of 10,000 times 100 cubic feet internal volume, or that she is of 10,000 *gross* tons.

This is also equivalent to saying that if we have a cargo of wool or hemp in bales, or starch in cases, of which 100 cubic feet will weigh a ton, then we could stow in that ship 10,000 tons of this cargo, provided we made no provision for engine or boilers or living spaces. That is, her *gross* capacity for such freight would be 10,000 tons, or she is of 10,000 tons *gross*.

But this is so theoretical that it brings up the necessity for still another sort of ton. Clearly we must allow space for the engines, crew, etc. Let us suppose that we find that these necessary spaces take up one-third of the ship and that two-thirds of the room are left for cargo. Then into this *net* space, this two-thirds, we can put two-thirds of 10,000 tons, or 6666 tons, of our hypothetical cargo. So we say the vessel is of 6666 *net* tons.

But there is another complication, for freight charges for such a cargo are based on tons of only 40 cubic feet!

Now, perhaps, we are better able to discuss the practical question, "How many tons of average, mixed, miscellaneous supplies will a given ship carry over and deliver to Europe in a year?"

This depends on how many trips she will make, consequently on her speed and on the wharfage facilities which give her quick or slow discharge. It depends on whether she is somewhat like the *Vaterland*—now the *Leviathan*—built for passenger and not for freight traffic. It depends on how much cargo space she must give up in order to carry enough coal for the voyage; if she is to make the trip at 20 knots she will require about eight times as much coal as if she is to do it at 10 knots. Allowing, however, in a fair, practical way for all these factors, and remembering that nowadays the vessel must take enough coal for the entire round trip and that she must zigzag and run fast in the danger zone, we believe that if from the average vessels now at the disposal of the government we take enough ships to represent one million *deadweight* tons, these same vessels will measure 667,000 *gross* tons, or 500,000 *net* tons.

Such vessels would carry on a single voyage about 450,000 tons of government supplies. In view of present terminal conditions, they would

make about five trips per year and deliver a total of 2,250,000 tons of freight.

Let us apply these figures to a single ship of, say, 7500 tons deadweight, which is about the average size of the steel ships now building under the shipping board. Then as to such a vessel the probable statistics are these:

She is of 7500 *deadweight* tons; take two-thirds of this and we may say she is of 5000 tons *gross;* again take two-thirds and she is of about 3750 tons net register; she will carry about 3500 tons of general cargo per voyage, will make about five round trips per year, and so deliver to our army about 17,500 tons of supplies per annum.—*Sea Power,* May.

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DESTROYER "MANLEY" BADLY INJURED IN COLLISION.

The destroyer *Manley*, one of the recent types of the U. S. Navy, was badly aged and her commanding officer and a number of enlisted men were killed, whe collided with a British warship abroad. A depth bomb exploding did the greatest of the damage. (Photo by International Film Service.)

INTERNATIONAL NOTES

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NAVAL WAR NOTES

PREPARED BY

LIEUTENANT W. B. JUPP, U. S. Navy

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STRATEGY

CAN OUR HEAVY SHIPS GO TO EUROPE?—The sending of more American warships to the other side, particularly if they have to be capital ships and if their station is to be the Mediterranean, brings us face to face with a serious problem.

Fighting ships, operating in distant waters, require the support of auxiliary vessels, a train of supply ships, ammunition carriers and colliers. The necessity for these auxiliaries and the situation of the United States Navy with regard to them was stated by Admiral William S. Benson, Chief of Naval Operations, to the Committee on Merchant Marine on March 9, 1916, as follows:

"In time of war, or preparation for war, it would be necessary for us to very largely increase the number of our auxiliaries in order to carry fuel, supplies, and, under certain conditions, a certain number of men. . . . . Should it be necessary for us to conduct a campaign across either one of the oceans . . . . it would be necessary to have a considerable number of fuel ships, not only to accompany the fleet, but many to be going back and forth from the source of supply.

Half a Million Tons Short.—"At present we have 24 fuel ships, and we are asking for a few more. . . . . We have 12 of the larger ones carrying from 7500 to 12,500 tons, and then we have a number (six or eight) of the smaller type of colliers that were bought at the outbreak of the Spanish-American War, but which are very small and rapidly reaching the stage where it does not pay to repair them. It is hardly economical to run them, because they carry so little coal. And then, of course, we hope in case of war to be able to draw on the Panama Canal colliers and fuel

ships. But even with all of those we find that at present we are short a certain amount, some four or five hundred thousand tons, of what we would need in time of war or proper preparation for it."

Our Navy's Needs.—In a letter to the Secretary of the Treasury dated July 27, 1915, Admiral Benson gave the requirements of the navy as to colliers as follows:

"Fleet colliers.—Number required, 4. Characteristics: Speed, at least 12 knots; steaming radius, 6000 to 8000 miles; gross tonnage, not less than 5000 tons (equivalent to about 7500 dead-weight tons).

"Service colliers.—Number required, at least 200. Characteristics: Speed, at least 8 knots; gross tonnage, not less than 3000 tons (equivalent to about 4500 dead-weight tons)."

The fleet colliers accompany the fleet and are built to coal battleships at sea. The service colliers would carry coal from the United States to the American naval base in Europe. Without this service an American battleship fleet in European waters would have to depend upon British coal—and the present shortage of coal in England and all the entente countries of Europe is a serious war problem.

Such was the situation in July, 1915. In March, 1916, Admiral Benson stated that "the conditions are just the same, practically."

The navy sought an appropriation for the construction of the four fleet colliers, Admiral Benson says, in 1916, but the naval appropriation bill of that year, making appropriations for the fiscal year ended June 30, 1917, did not carry such an item. The colliers were not provided for until Congress began the enactment of war emergency legislation. In his testimony before the House committee, Admiral Benson said, in response to inquiries as to the length of time it would take to build such vessels:

"Approximately six months would be required to prepare plans and place the orders for the material required for vessels of a new design. It would, therefore, require about two years to produce the first ships, and six such vessels could be constructed simultaneously during that time. . . . . After two years ships could continue to be produced at the rate of about seven a year, provided they were reproductions of those already built."

We Face a Serious Situation.—Undoubtedly, the situation with regard to colliers and auxiliaries in our navy is more serious than any other phase of our naval problem. The above review of the Russian situation shows clearly enough the likelihood that exists of an urgent necessity developing for the sending of more American warships to the other side. Altogether apart from that situation, however, there are many naval experts who believe that the whole American naval strength should be concentrated in the war zone. In any event the need for colliers and auxiliaries is obvious.

Naval preparedness, no matter how excellent it may seem on the surface, can be rendered useless by weakness in one element, and it is idle to attempt, in this war, to make things look better than they are. There is no desire to be unduly pessimistic, but it is high time that attention was given this situation and especially that steps be taken to supply and maintain the whole American naval force "over there."—*Sea Power*, May.

THE CHANNEL STRAITS.—By A. H. Pollen.—The following question has been put to me: "I observe that, in the current number of *Land and Water*, your colleague, Mr. Belloc, in explaining the enemy's selection of the Messines-Givenchy sector for his recent attack, points out that, among the arguments in its favor, 'for what it is worth there was the moral effect of an attack developing close to, and threatening that highly sensitive point, the straits of the Channel.' Is it not possible that he had something more than 'moral effect' in view?

"I am driven to ask this question: Is it possible the enemy has some objective, altogether independent of the direct military advantages of his procedure? Is he, in other words, trying to maneuver us into giving up Dunkirk, and then, possibly, Calais? If there were some overwhelming

naval advantage to be gained by the possession of Dunkirk, his policy might seem to be justified. Is it possible to state, with some precision, the change that would be brought about in the naval position if the enemy were either at Dunkirk, or at Dunkirk and at Calais?"

In essaying to answer this question, I shall not attempt to assess either the probability of or the military effect of our withdrawal from Dunkirk, or of our being compelled to give Calais to the enemy. Though the first seems to me highly improbable, and the second altogether out of the question, all I am concerned with here is to deal with the effect their tenure by the enemy would have in assisting his naval operations in impeding ours, and in giving him means, other than naval, for interfering with our sea traffic. Before attempting a reasoned answer, it might be as well to glance at what may be called our traditional policy with regard to the Dutch, Flemish and French Channel ports; for it is really to this tradition, and not to the facts of the situation of to-day, that we must look for the moral effect of which my colleague wrote last week. From very early times it has been taken for granted that the possession of these ports by an enemy must constitute a serious sea menace. It is largely for this reason that, ever since the fall of Napoleon, the maintenance of the independence and neutrality both of Holland and of Belgium has been a corner stone of our foreign policy. When, therefore, in September and October, 1914, the enemy, having seized Ostend and Zeebrugge, was engaged in a determined effort to get Dunkirk and Calais as well, the utmost uneasiness was created in this country. But I do not think many people could have stated explicitly their exact ground for uneasiness in the sense of being able to say precisely what particular naval and military operations the possession of these ports would have made possible for the enemy. People forgot that our historic attitude in this matter dated from the period when there were not only no submarines, but no 30-knot destroyers, nor guns with the modern command of range, nor air power. Consequently, if it was traditional policy with us that the Dutch ports, the Flemish ports and the French ports should be in separate possession, and two of the groups neutral, it seemed necessarily to follow that, if an enemy could get two groups into his own possession, not must an immediate blow have been struck at our prestige, but some kind of naval loss of a serious kind would follow. Calais and Dunkirk, then, grew into symbols just as Verdun did later on. To possess them became an end in itself, and hence their denial to the enemy became of crucial importance.

As a simple matter of fact, the actual possession of Dunkirk, or even of Calais—viewing the thing altogether apart from the military consequences involved—would affect the naval position adversely at a single point only. And the explanation of this is not very recondite. The two governing factors at sea are, first, that the enemy's only free naval force is his submarine fleet, which is almost independent of port facilities, and, secondly, that outside the immediate vicinity of his larger ports, the enemy possesses no freedom of surface movement at sea at all. If you examine these propositions separately, their truth becomes obvious. The two main and most profitable fields of the enemy's submarines have been from the Chops of the Channel westward, and in the Mediterranean *passim*. To be a thousand miles from its base makes, therefore, very little difference to the submarine. To give a submarine-using enemy a base a few miles nearer his main field would consequently confer no advantage on him of any kind whatever.

Curiously enough, if we suppose the Channel to be the field of their operations, the same thing is true about the enemy's surface craft, though for a very different reason. For, as things stand to-day—and as they would stand if he got Dunkirk, Calais, and even Boulogne—his freedom to get his destroyers or other ships out of harbor can be exactly measured by the distance he is from the nearest British base. The truth of this was instructively shown last week. Twice in the course of a few days

we heard that our ships had swept into the Kattegat and the North Sea, each time destroying German trawlers on outpost duty, and capturing their crews. On two other occasions unsuccessful efforts were made to cut off destroyers that had been bombarding parts of the Belgian coast, west of Nieuport. On each of these the enemy escaped in the darkness. The point of the contrast lies in this. When he is four or five hundred miles away from a British base, the enemy can venture out by daylight, so long as he does not go so far afield that he may be cut off and brought to action before dark. If no British force appears in such distant waters for some days together, he may even venture to send out light craft, such as trawlers, either to lay mines or to sweep for them, or to engage on some other operation. But even here he risks their destruction if he does so. But from Zeebrugge, which is less than 80 miles from Dover, he dare not venture out at all except by night. You never hear of German trawlers being raided off Ostend by Admiral Keyes' command. And, whenever there is news of an engagement, it is either a midnight or a mid-fog affair.

Zeebrugge and Ostend.—Zeebrugge and Ostend, then, are, on the experience of the last three years, perfectly useless to him for any daylight work. They are just jumping-off places for night raids, and refuges into which the marauders must rush for safety at the first threat of attack. Observe that never yet has the enemy in such encounters even pretended to fight the engagement to a finish. He runs—as he did the other day—though he had a force of eighteen boats against a bare half-dozen. He cannot, from the nature of the situation, even risk delay. He must always fear a still stronger force coming on the scene. Hence, they are not bases from which systematic naval operations could be carried out, nor any orderly form of sea-pressure be put upon us by regular and methodical operations. The fact, then, that we control the surface of the sea robs Dunkirk, Calais and Boulogne of any surface-craft value to the enemy, just because they are so much nearer to our main base at Dover than are Zeebrugge and Ostend. Indeed, we can go further. If he hardly now dares come out of Zeebrugge, it is doubtful if he would run and go into Dunkirk or Calais. Neither can help him then with his destroyers. And, because submarines do not require bases into which to run for refuge, these ports are unnecessary to him for his submarine campaign.

I said just now that there was one respect in which the possession of this strip of French coast would be an advantage to the enemy. It is that the blocking of the Channel at its narrowest parts by mine barrages would be either impossible or exceedingly difficult. But the possession of Dunkirk only would hardly affect this, for from Dunkirk to Cape Gris Nez is nearly 40 miles; and our establishment and maintenance of a barrage would not be affected unless the enemy occupied not only Dunkirk, but the whole coast right round to Boulogne.

We may then, it seems to me, make our minds comparatively easy as to the effect on the naval situation of any further advances of the enemy along the French seaboard, so far, at least, as the naval situation can be affected by purely naval means. But are there not other than purely naval means that would affect, if not our naval forces, at any rate the sea traffic which it is one of the main objects of naval force to protect and guarantee? The enemy, we are told, has been bombarding Paris with unpleasant regularity from a range of 75 miles. From Dunkirk to the Downs is not more than half this distance. Every mile he can push on of the 25 that intervene between Dunkirk and Calais will very nearly reduce the range of the English coast by an equal amount. Would it still be safe for ships to come up Channel and enter the mouth of the Thames? Or would London cease to exist as a port, except for such traffic as could come to it north about? Far be it from me to suggest the limits of the enemy's ingenuity in designing, or of his industry in producing, cannon of fabulous reach. But the merest tyro in the art of gunnery would be able to reassure us on the value of this artillery as a menace to trading

shipping going up and down the Channel. If the enemy held the coast of France from Dunkirk to Cape Gris Nez, his guns could reach Shoreham on the Sussex coast and Orfordness in Suffolk; so that the whole of Kent, all of Surrey and Sussex that lie east of the main Brighton line would be under his fire. His limit of range would be just short of Croydon, from a point just opposite Erith to the south of a line through Chelmsford and Colchester. The lower corner of Suffolk, including Ipswich, would complete the danger area. The Thames, of course, would be under fire almost right up to the docks in London.

This may all sound very terrifying, but it would be entirely without naval significance, for the simple reason that at these extreme ranges no aiming with a gun is possible at all; and the value of guns of this kind, trained even on a great city like London or Paris, is not distinguishable from that of regularly conducted air raids. Indeed, as far as destruction of life is concerned, it is probable that the same number of air bombs—from the fact that their explosive charge is so much greater—would be far more deadly than the 9-inch shell, which the German long-range gun is supposed to carry. As to such guns, or even the much more accurate naval gun, being mounted on the coast to prevent the passage of merchant shipping, this menace is entirely chimerical. If the best naval ordnance in the world were perfectly mounted and controlled from Dover or Calais, shipping could, in broad daylight on a clear day, pass up mid-Channel with complete safety, if they adopted the simple precaution with which every merchant skipper is familiar, from his experience with submarines. He has only got to zigzag his course to make hitting impossible at 10 miles, and at 20 no accurate fire of any sort would be conceivable. We must, therefore, look for a purely military explanation of the enemy's present military policy.

The Submarine.—Most people, when they think about the submarine, imagine its unique merit to be its power of unseen attack. This, however, is not really the case. For nine out of ten submarine attacks have to be made with the submarine either altogether or at least partially visible. The unique character of the submarine is its power of invisible passage. It can, that is to say, set before itself a destination, and by coming to the surface only during darkness, travel in almost continuous invisibility until it has reached the desired point.

The development of under-water hearing makes it possible in some conditions to discover that a submarine is in the neighborhood. But under-water hearing cuts both ways, and for the moment it is doubtful if, in the open sea at least, the submarine has not gained most by its development. For, being able to lie motionless—and therefore soundless—on the bottom, it can, by periodically stopping to listen, decide whether at any moment it is safe to come to the surface or not. For practical purposes, therefore, the submarine, if it can avoid mines, can navigate the seas with comparative freedom from risk. Hence, though I have no definite information to guide me, I will hazard the guess that 95 per cent of the submarines that are destroyed are caught either when they are on or near the surface for purposes of attack, or just after diving from the surface, when the area within which depth charges will reach them can be judged with sufficient accuracy to make the counter-attack almost sure. It follows, then, that only such submarines are destroyed as are either surprised when their commanders think they are in safety, or intercepted when their commanders think they are taking a legitimate risk in coming up. Thus anti-submarine offensive depends for its efficacy almost entirely upon the greed of the submarine for its prey, just as the—very uncertain—success of the angler depends, as Sir William Simpson says, on the appetite "of a scaly but fastidious animal."

When men fish for a living, they do not rely on anything so uncertain as the combination of skill and judgement of the angler with the appetite or voracity in the fish. They deal with the quarry not as a creature that can

be tempted to the surface, but as a resolute denizen of the depths, and proceed to intercept him between his starting-point and his designation by means from which, being invisible and submerged, he cannot escape. The professional fishermen, in other words, recognize that the under-water quarry, if it is to be attacked wholesale, must be attacked by under-water means. The application of this counsel to the case of the submarine has, from the first, been obvious enough. The arming of merchantmen and their convoy by gun- and depth-charge-carrying destroyers, the regular patrolling of infested areas to search for submarines while recharging their batteries on the surface at night, the employment of aeroplanes to discover them near the surface—all these things may be likened to the angling side of the fisherman's craft. It is no doubt the more attractive form of fishing. It appeals more to the artist and to the sportsman. But it is too accidental to be the method that gets satisfactory results in fish brought to market. For this, wider and, if you like, brutal ways are better. For obvious reasons, you cannot trawl for submarines, nor does it seem likely that stationary obstacles, whether nets or otherwise, would be effective—if merely designed to impose a passive barrier between the submarine and his destination. Through any such obstacles as these some means could certainly be found of using a torpedo to clear a passage. But it is not at all certain that the submarine could ever find a way of evading continuous mine-fields, spread from shore to shore over the Channel and North Sea, and repeated at different depths, so that at no level or even on the surface could a safe passage be found. It looks, then, as if the only wholesale method of dealing with the submarine is to make its passage through any tract of sea that it is bound to pass, if a destination is to be reached, wholly impossible.—*Land and Water*, 11/4.

TIME LOST ON CONVOY.—*Grouping of Vessels by Speed Suggested.*—It is well known that the introduction of the convoy system has proved a success in the safeguarding of merchant vessels, and it is equally well known that there is a serious loss of carrying capacity owing to the greater length of voyages at present, as compared with the time occupied before the war. Part of this loss is clearly inevitable in view of the precautions which are taken; but Liverpool owners are of the opinion that some of the loss is avoidable.

Liverpool owners are interesting themselves especially in the matter, because it is they chiefly who are concerned with the North Atlantic trade, and in a comparatively short-distance trade, such as this, the loss soon becomes apparent. Now one great drawback to the convoy system is that the speed of the fastest ship in a convoy has to be reduced to the speed of the slowest ship. Obviously, therefore, in order to obtain the advantage of the speed of the fastest ships the most economical system would be to group the vessels of about the same speed together.

It is claimed that by putting this system into practice the dead-weight carrying capacity of the existing ships in the North Atlantic trade could be increased by between 450,000 and 500,000 tons per annum. In arranging the grouping of the faster vessels, the British and United States Admiralties could rely on the thorough support and assistance of the great liner companies. Similar help would no doubt be forthcoming from the cargo companies. The criticism is made that there is at present not sufficiently close working respecting the formation of convoys between the Admiralty and the Ministry of Shipping. As an instance, the cases are cited of two vessels which were recently kept waiting 11 days in the Mersey for escorts, and of two which were kept waiting there for seven days.

The present need of cargo space is so urgent and the carrying capacity of the liners in the North Atlantic trade is so great, that it is particularly important that no time shall be unnecessarily wased. Certain delays are, as already pointed out, inevitable, but owners believe that the loss due to the grouping of vessels of varying speeds is unnecessary. The first

step in the direction of avoiding this loss would seem to be for the Admiralty to consult with the managers of the liner companies. The owners realize that the last word on the subject of the management of convoys must be spoken by the naval authorities, but they believe that they can be of very great assistance, and they are anxious to do everything within their power to bring about a saving of carrying capacity.—*London Times*, 3/4.

LAST WORD WITH SEA POWER.—*A Vienna Comment.*—The Vienna *Arbeiter Zeitung* publishes the noteworthy admission that, whatever victories Germany may win ashore, the last trick is always in the hands of the masters of the seas. It says:

"Let no one deceive himself. Germany's victories may make the Entente more inclined to a peace by agreement, but by no victory can they be compelled to submit to a peace by compulsion. For even if the German sword should be able to achieve much more than it has yet done—if the Germans should storm Calais and march into Paris, and if the continuation of land warfare should become senseless and impossible, the English would still remain protected on their island and America by the Atlantic: they could still continue warfare by sea, and still cut off our supplies of raw materials and foodstuffs. The greatest victory on land cannot force upon England and America a peace by compulsion.

"Thus a peace is only possible if the German people refuses to allow itself to be intoxicated with victory."—*London Times*, 1/4.

A NEW GERMAN PORT.—By Arthur Pollen.—When Kerensky fell and the fortunes of Russia were confided to a government of fanatics and traitors, it became obvious that the military situation on the western front would suffer a change very damaging to us, as soon as the enemy troops, hitherto contained by our late ally in the East, could be transferred to the sole remaining field of war. What in the late autumn it was obvious must happen, has in the last three weeks actually happened. To what extent, if at all, is the naval position adversely changed by the elimination of Russia from the war?

Some weeks ago it was pointed out here that the most obvious of the naval advantages that Germany could gain by her advance on Petrograd would be the possession of so much of the Russian Baltic Fleet as was either in fighting condition or could be completed or refitted. If the battleships and battle-cruisers of the old program had been ready by their due dates, were in fighting trim, and were so surrendered, the enemy's reinforcements might be so formidable as to make it necessary for the Grand Fleet to be enlarged by all of the American 14 dreadnoughts. Nothing appeared in our press on this subject since that article was written until last week, when Reuter's correspondents at Stockholm and Petrograd informed us that the Germans had landed 40,000 men, 3000 guns, 2000 machine-guns and armored cars at Hango, and had already advanced to Ekenaes, 20 miles along the railway which, 70 miles further on, forms a junction with the line that leads down to Helsingfors. We learned also that at Helsingfors are moored two Russian battleships, a division of destroyers, five submarines, and numerous transports, and that these are icebound and cannot move, because the only ice-breaker had left Helsingfors and surrendered to the Germans at Revel, just before the landing at Hango took place. At Hango itself there were four submarines and several other Russian warships, and the commanders of these vessels, being unable to resist the landing, blew them up rather than that they should fall into the hands of the enemy.

The only satisfactory feature of this news is that some Russian warships are still under the command of men loyal enough to their country to prefer seeing their ships destroyed to seeing them tamely handed over to the enemy, not only of Russia, but of mankind. Whether the battleships

at Helsingfors are in such loyal hands we do not know. It would clearly be possible, by exploding small charges in the engine-rooms, the gun-mountings, in the guns themselves and in the ships' bottoms, to put the vessels beyond the possibility of repair, and to do so without risk of any kind to the surrounding population, supposing the ships to be moored where their complete destruction, by blowing up the magazines, would be a public danger. If they are not in such hands, the first accession of naval strength to the enemy will become an accomplished fact, and allied plans will have to be altered to meet them.

But, as has been foreseen from the first moment when the German expedition into Finland was announced, the enemy has a second naval objective in view which, if it succeeds, may prove far more embarrassing to us than any increase of his battleship, cruiser or destroyer strength. On Wednesday last week *The Times'* correspondent at Petrograd announced that Germany's Finnish allies were already advancing on Kem, a port on the North Sea, the most important town on the Murman Railway that connects Kola with Petrograd. This correspondent also hints that some allied effort is being made to prevent this railway falling into traitorous hands. If the possession of Kem were followed up by the effective occupation of Finland, not only would Petrograd be hemmed in from the North, but German access to an ice-free Arctic port would seemingly be secured, except for such opposition as a navy working with or without military assistance could oppose. The possession of this port would be of incalculable value to the enemy for various reasons.

The latest maps seem to give the name of Romanov na Murmanye to this latest Russian effort to get access to the sea, and it is situated halfway up an inlet known as Kola Bay, which is, in fact, the estuary of the River Tulom. It is situated about 75 miles from the Finnish and Norwegian boundary in the Varanger Fjord. Though nearly 10 degrees north of Archangel, it is not ice-bound in winter. It is not the lowness of temperature that makes Archangel useless in the winter months, but the fact that the southerly currents from the Arctic Ocean, combined with the prevailing winds, carry the ice floes southward into Dwina Bay, and there pack them in such masses that it is neither possible to prevent the channel being altogether blocked, nor to blast nor break a channel when the block has taken place. Kola Bay is free from both these phenomena, and though the surface may freeze, it seldom, if ever, attains the thickness that cannot easily be dealt with.

The advantages that a properly equipped port at this point would give to Russia had long been realized, and ever since the beginning of hostilities great and sustained efforts have been made, not only to complete the port itself in every respect for the reception and unloading of ships, but to complete the Murman Railway to connect the port with Petrograd. There is reason to believe that both port and railway are now ready for use.

Kola Bay.—If the Germans could seize the sea-board railhead, and establish railway communications either with Helsingfors or Petrograd—which they can occupy when they will—they could establish there a new submarine base free from the very patent disadvantages of those from which her under-water craft have now to operate. If we suppose, as seems likely, that the English channel will before long be made impassable for the submarine, and further suppose that the enemy's main field of operations must always be the western end of the Atlantic lanes, Kola Bay will only be some 600 miles further from the submarine destination: a very inconsiderable handicap when it is remembered that, in exchange for 600 miles of well-patrolled and, therefore, highly dangerous passage, the U-boats will have but double this distance to go—and a journey in which almost complete immunity from attack may be expected.

All these considerations have long been before the allied governments, and it cannot be doubted that some and, let us hope, adequate measures have been taken to prevent, not only the Murman Railway with its port,

but, if possible, Archangel, too, from falling into enemy hands. Should certain measures, however, not prove adequate, new duties will be thrown on our naval forces, and it is perhaps worth considering what they must involve.

The advantage of a Kola Bay port to the Germans would be the possession of a port free from what might be called the geographical shortcomings of her present naval bases. It is, of course, not a base that would be of value for anything except for submarine work, for it is inconceivable that any useful number of surface ships—even of the fastest destroyers—could pass through our guard and reach so distant a point in safety. And from this it follows that it is *in theory* a port, the use of which by submarines could be denied to the enemy by close investment. As has so often been pointed out, the present German bases cannot be blocked by a mine-barrage because mine-fields must be protected by surface ships, because the integrity of the German Fleet would make the defence of a mine-field near to the German harbors possible only by employing our own battleships there, and because to employ our battleships in narrow, shallow, and uncharted waters, would expose us to such disadvantages as to make the risk almost impossible. But if no powerful surface ships could be brought into Kola Bay, then a close investment of this inlet by a mine-field, watched by surface vessels more powerful than anything the enemy could have there, should, as I have said, be possible. But I use the phrase "in theory" because the actual operation would present extraordinary difficulties. For we should be, presumably, without a base on the Murman coast ourselves, and to maintain an inshore watch in the Arctic regions, 1200 miles or more from the nearest port in which it would be possible to refit ships and refresh crews, would be an undertaking entirely without precedent in warfare. Emphatically, therefore, the problems that must arise from the German possession of a port in Kola Bay are far better dealt with by prevention than by cure.—*Land and Water*, 11/4.

AMERICA'S FIRST MILLION TONS OF SHIPS NOW AT SEA.—The first million tons of ships completed and delivered to the United States Government under the direction of the Shipping Board have been put on the high seas to help defeat Germany.

A total of 159 vessels of 1,108,621 tons was completed up to May 11, according to statistics compiled by experts of the Shipping Board. Since January 1 more than half of the total tonnage, 667,896, has been delivered, and the monthly totals have shown a steady increase.

Most of the ships delivered were requisitioned on the ways or in contract form when the United States entered the war. Virtually all are of steel construction. None of the ships of the great wood program has been delivered, although 46 have been launched, due to delay in obtaining boilers and other machinery. The first completed wood ship built on contract for the government now is undergoing speed trials off the Pacific coast. Deliveries of ships last week were made at Seattle, Sparrows Point, Md.; Chicago, Ecorse, Mich.; Gloucester, N. J.; Wilmington, Del., and New York.

It was said to-night at the Shipping Board that boilers for about half the wooden hulls have been delivered and are awaiting installation.—*N. Y. Herald*, 15/5.

NEW U-BOAT RAIDERS TO COMBAT DESTROYERS.—*Frenchman Reports Latest Under-Sea Plans of Germany as Formidable.*—Realizing that the United States and allies have gained the mastery over the present type of submarine, Germany now is said to be planning a new series of big U-boat cruisers with which she hopes to again assume the offensive in her unrestricted under-water warfare.

Announcement of the new German scheme was made by Georges Leygues, the French Minister of Marine, in a recent interview, copies of which

have been received here from France. No details regarding the new U-boats were given by M. Leygues. From information from other sources, it appears that the cruiser submarines will be heavily armed and armored, and will be designed especially to meet the menace of the torpedo-boat destroyers which have proved so effective in hunting down the smaller submarines now in operation.

M. Leygues declared that the Allies are ready to meet Germany's new efforts and that they will not rest upon the "fine results obtained" in the past.

"We shall not stop," he said, "until we have cleaned up the sea as one cleans up a trench."—*Evening Star*, 14/5.

NAVAL AFFAIRS IN THE NORTH AND ELSEWHERE.—Recent British naval successes in the Cattegat, minor though they were in extent, differ greatly in character from the raids occasionally ventured upon by the Germans against the small auxiliary vessels guarding the Straits of Dover. The former were sustained efforts at a distance of 500 miles from home bases, and the latter are merely "tip and run" dashes to points well within an hour's easy steaming from either Ostend or Zeebrugge. Quite apart from material gains the Cattegat affair demonstrated that the command of the sea in the north, and, for that matter, the world around, is held in the clenched fists of the Allies; so far, indeed, from the British High Sea Fleet being "in hiding," it is eager and ready at a drop of the hat to engage the High Sea Fleet sulking behind its mine-fields and unwilling even to support the trawlers virtually destroyed in its own protected waters.

Now that the uncompensated hazards of attacking Wilhelmshaven or the mouth of the Elbe are recognized, some attention has been directed to the possibility of laying sea barriers across the lanes through which German submarines gain access to the ocean. But apart from the discontent this has excited as fresh evidence of a policy of attack, but not of defence, the possibility of associating nets and mines over the wide areas to be covered is not generally advocated, particularly as similar experiments have been discouraging.

Whether justified or not, it has to be accepted that considerable disquiet exists at the alleged lack of "initiative" on the part of the allied fleets, and that insistence is laid on the fact that a systematic defensive policy has always proved to be the most costly and disappointing form of warfare. This is finding especial expression since the collapse of Russia and the possibility that the Germans may take over its disintegrated fleet, or, in any event, find in the undisputed Baltic a safe region for that training of their ships and personnel so long denied. Little alarm is felt over any probable issue from the Dardanelles of the Black Sea Fleet, led by the *Goeben*. The combined French and Italian squadrons muster at least 17 dreadnoughts, and these, with their auxiliaries, should be able to take care of the heterogeneous vessels fresh from the Black Sea and of any reinforcements the Austrians may be able to send out from Pola.—*N. Y. Herald*, 19/4.

GERMANY DREADS SEA FIGHT, LOGIC OF BRITISH SHOWS.—The British naval success against German mine-sweepers in the Cattegat recently, says the *Daily Telegraph*, is sufficient answer to the Germans, who say that the British Grand Fleet is hiding.

Contrasting the British fleet in the Cattegat with the German raids in the Straits of Dover, the *Daily Telegraph* states that while the Germans in their bases on the Belgian coast are only 20 miles from the Straits, the exploit in the Cattegat was a carefully planned operation conducted more than 500 miles from the nearest point on the British coast.

"Such a sweep," the newspaper adds, "can be made only by a power in real control of the sea confronted by an enemy who will not risk protecting his small craft and suspecting that such intervention might be the

prelude to a general action, which he desires to avoid. The Germans had large naval forces near the scene on this particular Monday. They did not send them out, but, on the contrary, permitted 10 trawlers to be destroyed virtually under their own eyes."

The newspaper then discusses the theory that the Germans might be inviting naval action near their mine-fields and coast defences, and says that all such suggestions have no foundation among those who have knowledge of naval conditions.

The enemy, it says, has gained little new strength for use in the North Sea by the Baltic situation, while British superiority has been increased since the battle of Jutland by the co-operation of the American forces, and the entire naval strength of the United States would be available if necessary. Moreover, if the German naval forces were to be employed advantageously as the right wing of the German Army, they should have been thrown in before and not during or after the opening of the battle in France.

"If a naval battle," it continues, "could by any possibility have been decided in Germany's favor, she would have been saved the necessity of pressing forward her army and would have spared hundreds and thousands of casualties, which, on her own confession, she could not afford.

"A battle on the sea is fought simply to gain the right to use the seas for military or economic purposes. The Germans have wanted to attain that end for three years and eight months, and if they have not done so while the odds against them were less heavy than they are to-day, the reason is on the surface.

"Still we can dismiss from our minds all unsupported rumors. The watch by sea was never maintained more efficiently or more effectively than the Grand Fleet is maintaining it at this moment."—*N. Y. Herald*, 19/4.

THE DESTROYER IN THE WAR.—By M. B. Dill.—Naval authorities have frequently remarked during the course of the war, that as far as the navies of the nations are concerned, modern warfare has been much different than was ever expected.

This fact is due almost entirely to the submarine menace which has changed the plans and problems of the navies of the world in a most unexpected fashion. One of the surprising developments which has come about has been the sudden prominence of the destroyer in naval engagements and for general utility service. This new importance of the destroyer is one of the changes in naval warfare brought about largely by the activities of the German submarine against neutral and enemy commerce.

A few months before the war many of the allied naval authorities were inclined to look upon the destroyer as a type destined possibly to an early disappearance. The destroyer it was believed would be superseded by the swift submarine, just as it had taken the place of the torpedo-gunboat of two decades before. But the submarine while constantly growing larger and more effective has yet to develop the under-water speed and the surface offensive power which would make her supersede the destroyer.

One of the early proposals of the Navy Department when war was declared was for an immense emergency fund for building destroyers to cope with the submarine peril. This fund has been utilized effectively and already many new destroyers have come into the American Navy and each day there is unofficial recognition of the launching of more fresh ships of this type. The allied and enemy powers have also devoted considerable of their naval building efforts to the construction of destroyers. It is estimated that Germany has probably added from 80 to 100 destroyers to her battle fleet, for these little vessels have appeared bearing numbers that under peace time conditions would have been given to ships which would be built in the 1919-20 building programs. England has devoted more attention to destroyers and as early as the battle of Jutland, many of

the record made recently for the new type destroyer was 51 weeks from the laying of the keel. With records of this kind in construction, it will not be long before a most formidable fleet will be on hand to guard the new merchant marine and to assist the battle fleet when the time for a naval engagement comes.—*The Naval Monthly*, May.

LESSONS OF THE WAR

LOSSES IN NAVAL WAR.—By Percival A. Hislam (British).—The character of naval losses has undergone a considerable change since the last great wars in which we were engaged, and to this a variety of causes have contributed. The substitution of steam for sails has rendered ships less liable to the ordinary perils of the sea; while it is not necessary for us to-day, as it was in Nelson's time, to keep in commission a large number of small ships for the special purpose of dealing with the enemy's privateers. To a very large degree the U-boat stands to-day as the modern, degenerate representative of the old-time privateer, and the destroyer counterparts the light craft that used to be employed for hunting down the hostile corsairs; but while the destroyer is a great advance in seaworthiness over the 8- to 16-gun vessel of the beginning of last century, the losses among this type have been, as one would expect, relatively heavy. The greatest revolution of all in the cause of naval losses is due to the change in the material used in ship construction and to the development of methods of attack. Speaking comparatively, the wooden warship was unsinkable in action. There was no means of attacking her beneath the water-line, and the damage caused by chance shots striking between wind and water could usually be made good from within with very little trouble; while in the case of shot striking above the water-line, their only chance of doing considerable material damage lay in the possibility of causing a fire. Ships that were badly knocked about and had lost their masts were frequent victims to bad weather before their injuries could be made good; but the general chance of a vessel being actually sunk in action is indicated by the fact that out of 162 units of the Royal Navy lost in the five years 1804-1808, inclusive, only two were lost in this way. One was the 10-gun hired cutter *Constitution*, Lieut. J. S. A. Dennis, sunk in August, 1804, by a 13-inch shell which crashed through her deck while she was engaging the enemy batteries and flotilla at Boulogne; and the other was the *Rapid*, 12, Lieut. Henry Baugh, sunk by batteries in the Tagus in May, 1808. Within the same period two of our vessels were sunk to avoid capture. In the present war this has been done by the Russian *Prut*, and by the German disguised minelayer *Meteor*, which after sinking the British auxiliary *Ramsey* in the North Sea on the 8th of August, 1915, destroyed herself the following day to avoid capture by a squadron of our cruisers. The British steamer *Turritella*, made prize by the raider *Wolf* and converted into a minelayer, was similarly destroyed. It is understood that this variation of hari-kari is observed with unusual determination by the crews of enemy submarines.

The capture of a commissioned ship has been a very unusual feature of the present conflict, and this for several reasons. In the old days—the Nelsonian period—the main object in battle was to disable the enemy's armament, and his destruction was probably never aimed at deliberately. This, it will be remembered, is the theme of Sir Reginald Custance's "Ship of the Line in Battle," in which it is argued that the "defeat" of the enemy and the disablement of his guns are the objects to be sought. It is much to be doubted, however, if in any naval action of the present war a single shot has been fired with the object of disabling the armament or "defeating" the crew of an enemy warship. The objective is always the ship—and her destruction. It could hardly be otherwise, seeing the ranges at which modern engagements may be fought, the urgent need for the most rapid fire possible consistent with accuracy, and, more important

than anything else, the fact that the destruction of the ship involves *both* the defeat of its crew and the disablement of its guns, and is a much more practicable proposition from the gunnery point of view than an attempt to demoralize a ship's company with a hail of small projectiles or to knock a turret over the side. The material, structure and contents of a modern ship of war all tend to make her destruction a relatively simple matter compared with the task that faced the gunners of a hundred years ago, while torpedoes and high explosive projectiles have helped considerably to banish the word "surrender" from the vocabulary of modern navies. A ship's armament may be annihilated and her crew demoralized; but there is rarely or never an appreciable interval between the one or the other and the plunge to the bottom. The best remembered case of surrender in the present war is that of the *Emden*, which gave in to the *Sydney* after suffering heavy losses and being driven aground. In at least one official document the incident is referred to as the "capture" of the *Emden*, but "destruction" is the word commonly used. A more remarkable capture, accomplished without the firing of a shot, was that of the German gunboat *Komet*, taken by surprise in New Guinea by the late Lieut. Commander J. M. Jackson and a boat's crew from the Australian auxiliary vessel *Nusa*. The *Komet* is now in service. The capture and recapture of the gunboat *Firefly* on the Tigris will also be recalled.

Nothing came as a greater surprise in the early days of the war than the number of officers and men involved in the unfortunate incidents that occurred. Not a soul was saved from the *Good Hope* or the *Monmouth*, while over 1400 lives were lost when the *Aboukir*, *Hogue* and *Cressy* were torpedoed. It has been stated that in the naval campaigns of the Russo-Japanese war the combined losses on both sides were only 1883 killed and drowned, and 1809 wounded; but the figures do not seem to carry conviction. Here, however, are the losses sustained by the British Fleet in five of its most renowned fights of the sailing days:

	Killed	Wounded
1st of June, 1794	290	858
St. Vincent	73	227
Camperdown	203	662
Nile	218	678
Trafalgar	449	1242

The total of killed in these five victories did not exceed by more than a hundred the loss of life involved in the destruction of a single British battle cruiser, the *Queen Mary*, in the battle of Jutland Bank. According to a table published in "Naval Power in the War," by Lieut. Commander C. C. Gill, U. S. N., the German Admiralty claim that the British loss in this action amounted to 117,150 tons and the German to 60,720 tons, while the personal losses are given as 6105 and 2414, respectively. There is no means of testing the latter; but it may be pointed out that in the list of officers and men killed in action, printed with the quarterly "Navy List," our total losses for the month of May, 1916, were 324 officers and 5348 men. The aggregate for the month, therefore, does not equal the German claim for the Jutland battle; which, of course, undoubtedly accounts for practically this entire list. It will be observed from the above table that in the old sea fights the wounded outnumbered the killed in the proportion of just about three to one. Under present conditions the tables are most emphatically turned, the principal reason being the poor chance a wounded man has of being saved from a doomed ship.

The latest edition of *Fighting Ships* contains a pretty complete list of the known naval losses of the various powers during the war. In preparing the following analysis I have included in addition the armored cruiser *Drake*, torpedoed by a submarine on the 2d of October, 1917, and the monitor *Raglan*, destroyed by the gun-fire of the *Goeben* on the 20th of January, 1918. These vessels are not included in the list referred to.

The table which follows represents armored ship and cruiser (not light cruiser) losses only:

British Armored Ship Losses Reported in the War Down to the 23d of February, 1918

Cause of loss	No. of ships	Tonnage	Percentage of tonnage to total of loss
Torpedoed by submarine.....	14	143,525	33.52
Sunk by gun-fire	10	136,885	31.98
Sunk by mines	7	76,110	17.78
Destroyed by internal explosion.	3	47,800	11.17
Torpedoed by a surface ship....	1	12,950	3.02
Wrecked	1	10,850	2.53

It will be seen that the two forms of under-water attack—the sinking of the *Goliath* by a Turkish destroyer being omitted from this category—accounted for 21 ships out of 36, and for 51.3 per cent of the destroyed tonnage. It should be pointed out that in spite of very definite official statements, a good deal of doubt is still entertained in many quarters regarding the actual cause of the loss of the *Hampshire*, which is stated to have been mined; and there is some difference of opinion, also, as to whether the *Irresistible* and *Ocean* were sunk by mines (as officially recorded), or by torpedoes, possibly dirigible, on the Brennan principle, discharged from concealed shore stations in the Dardanelles.

The principal fault with the above table is that it includes only three groups—or, perhaps, one should say but two—of the many that go to make up a navy. It is, however, impossible to extend it with any real satisfaction owing to the insufficiency of the published facts regarding the minor types, particularly in regard to tonnage; but the inclusion of these types would make a considerable difference both to the aggregate and the distribution of the causes of loss. The following, for instance, is a statement of the losses of armed merchantmen announced by the Admiralty during 1917:

Laurentic, believed mined; *Hilary*, torpedoed by submarine; *Otway*, torpedoed by submarine; *Champagne*, torpedoed by submarine; *Orama*, torpedoed by submarine; *Stephen Furness*, torpedoed by submarine; *Arbutus* and *Grive*, foundered after being torpedoed by submarine; *Osmanieh*, mined. Under-water attack accounted for the whole of these ships, and as, apart from drifters and trawlers, we lost from gun-fire in the same year only the seaplane carrier *Ben-my-Chree* and the destroyers *Strongbow*, *Mary Rose*, and *Partridge*, it is obvious that the inclusion of all classes of vessels would effect an appreciable change in the complexion of the table. It should also be pointed out that of the loss by gun-fire shown above, no less than 76.5 per cent of the total tonnage was lost in the Jutland fight (six ships of 104,700 tons), so that another action of this sort—the probability of which appears to grow less with the prolongation of the war—might be reasonably expected to send up the gun-fire total considerably; unless, of course, we should have the good fortune to discover, what so many navy critics appear to demand, an admiral who can win battles without sustaining losses.

The estimate of losses is, of course, one of the most essential duties of a staff, for the decision as to whether a certain operation shall be undertaken must inevitably rest in the end upon the comparison between the results to be achieved and the price to be paid in attaining them. The first report of the Dardanelles Commission is the only document so far published which gives us an actual insight into the working of the staff system in the navy—or of what passed for a staff system in the early months of the war—and it contains two interesting references to this very subject. Lord Fisher had stated that in his opinion he attended meetings of the War

Council simply that he might answer questions if he was asked. The question was put: "And were they ever asked?" To which he replied: "They were sometimes, because I was asked how many battleships would be lost (in the attack on the Straits), and I said 12." The War Council thus knew, from the highest professional advice they could obtain—that of the First Sea Lord—that the forcing of the Dardanelles would cost 12 battleships. In full possession of that knowledge, they decided upon that operation; but they quickly dropped the whole business—that is, the purely naval attack—as soon as we had lost three. This is one of the difficulties inseparable from the constitutional policy of leaving high decisions in the hands of civilians. They neither understand the advice they receive from the experts nor appreciate the fact that success in war cannot be achieved without paying the due price for it. They are willing to try things as a speculation so long as they can back out when their nerve begins to give; and when the *Ocean*, *Irresistible* and *Bouvet*—25 per cent of our expected losses—went down in the Dardanelles, they probably recollected suddenly Lord Fisher's warning that "even the older ships should not be risked, for they cannot be lost without losing men, and they form the only reserve behind the Grand Fleet." Of course, Mr. Churchill produced "an elaborate analysis" of comparative naval strength, conclusively showing that Lord Fisher was a querulous old gentleman whose fears were groundless and that we could quite afford the probable losses; but in spite of this the whole business was dropped like a hot poker after the first day's losses. Mr. Churchill has since put the blame for this upon the public, who are said to have been staggered by what was happening; but if politicians have any value at all in this sort of work it should surely be as a guide to how the electorate, which they know so well, is likely to behave in a particular set of circumstances.

One of the notable features of the war from the standpoint of the present article is the steady increase in the loss of destroyers. This is strongly shown in the following half-yearly analysis, which is not based exclusively upon official announcements. The information embodied in it has been accumulated from a variety of sources.

	British destroyer losses (For explanation, see below)					
Half-year	A	S	M	W	C	Total
Aug. '14–Jan. '15	–	–	–	1	–	1
Feb. '15–July '15	–	1	1	1	–	3
Aug. '15–Jan. '16	–	–	2	1	–	3
Feb. '16–July '16	8	–	1	–	2	11
Aug. '16–Jan. '17	3	–	1	–	2	6
Feb. '17–July '17	1	1	8	–	2	12
Aug. '17–Jan. '18	3	3	4	3	2	15

Explanation.—"A" = sunk in action with surface ships; "S" = sunk by submarine; "M" = sunk by mine; "W" = wrecked; "C" = sunk in collision.

The "steady increase" referred to above will be the more marked if one rules out the eight vessels sunk in the Jutland battle; but even with those included the losses for the last two periods covered were greater than those of the first five. In the case of such vessels as these, which are constantly at work discharging all sorts of functions under all sorts of conditions in all sorts of places, a great deal will naturally depend upon the number in commission, and although nothing official has transpired on this particular subject, there is very good reason to believe that we have at least twice as many destroyers in service to-day as we had in the first month of the war. Such an increase legitimately permits of greater risks being taken; and it also means that when there are mines about there is a greater chance of one of them being hit, and that there is an increase in

the number of targets available for enemy submarines. It is, in short, impossible to judge of the real significance of these destroyer losses without knowing the number over which they are spread and the work they have been doing. The improvingly satisfactory position in which, according to Mr. Lloyd George, Sir Eric Geddes and Lord Jellicoe, we find ourselves with regard to the submarine menace is very largely due to the work of our destroyers, and only those who can see both sides of the ledger can balance up the profit and the loss and see where the real truth lies. It would be worth a very great sacrifice to overcome the submarine menace, and certainly the advance in our destroyer losses is far from disproportionate in comparison with the fact, of which we have been officially assured, that towards the end of 1917 the destruction of U-boats was proceeding at four times the pace we reached in the previous year.

In the last period covered in the above table the number of war vessels of all classes announced by the Admiralty as having been sunk by submarines was 18, if we include the three destroyers lost in the North Sea on the 22d of December, while in the previous six months corresponding (August, 1916, to January, 1917) the number was only six, and this included the *Nottingham* and *Falmouth*, which were operating with the Grand Fleet to meet the German sortie of the 19th of August, 1916, and also the battleship *Cornwallis*, sunk in the Mediterranean. It seems highly probable that there is a distinct and direct connection between, on the one hand, the growing success of the campaign against the U-boat and the reduction in the rate of loss of British merchantmen, and, on the other, the increase in the loss of warships through under-water attack. We know, for instance, that the convoy system was brought into general use during the early half of last year, and there is no doubt that this tends very appreciably to increase the risks run by warships. Indeed, it may be said that it is the purpose of the convoy system to shift the burden of risk from the merchantmen to the warships escorting them. In convoying through areas infested by submarines, it is the object of the escort to keep the U-boats at such a distance from the convoy that the latter cannot be attacked. In other words, the escort becomes a screen between the enemy and the merchant ships; and although the war vessels and their personnel are much better adapted for dealing with submarine attack, it follows that their chances of being torpedoed are increased in much the same ratio as those of the merchantmen are reduced. The attacks on the North Sea convoys in October and December last, resulting together in the loss of three destroyers and a number of merchantmen and armed trawlers, did not arise from any failure of the convoy system. The merchantmen were provided with an escort which, in the absence of evidence to the contrary, we may presume was adequate for its particular purpose, namely, their protection against submarine attack. For the checkmating of other forms of attack, other arrangements were made, and it was these which broke down, leaving the destroyers and trawlers exposed to an onslaught the like of which it was never expected they would encounter. At the moment of writing only one official announcement has been made regarding the torpedoing of an escort vessel, this being the *Mechanician*, which stranded and became a total loss in the channel after being "submarined" on the 20th of January last. It was not stated that she was accompanying a convoy at the time.

Reference may fittingly be made in this article to the loss of merchant shipping—a subject which even yet is not generally associated in the public mind with the shortage of food and the varied activities of Lord Rhondda. The first declared enemy campaign against merchant shipping opened on the 18th of February, 1915, and in the 35 succeeding weeks over which regular returns were issued by the Admiralty, we lost a total of 175 ships—an average of exactly five a week. The so-called "unrestricted" campaign began on the 1st of February, 1917, but the weekly official returns began, as before, on the 18th of February. The following table

summarizes our losses quarter by quarter for the first 52 weeks of this phase:

Sunk	1600 tons and over	Under 1600 tons	Fishing vessels	Total
1st 13 weeks	269	121	103	493
2d 13 weeks	237	52	45	334
3d 13 weeks	159	74	12	245
4th 13 weeks	157	48	21	226
Total	822	295	181	1298

U-BOAT'S BEST HARVEST FIELD.—In an article in the Stockholm *Aftonbladet* of March 24, Dr. K. A. Melin states that no less than 1650 vessels were sunk in the barred zone around England and France during the first year of Germany's unrestricted submarine warfare. Along the west coast of England 580 ships were sent to the bottom, while 430 were sunk in the English Channel itself. One hundred and seventy vessels were lost in the approaches to the English Channel and 270 along the east coast of England. Along the French coast only 200 vessels have been lost, which shows that the main effort of the German submarines has been directed against British shipping. Dr. Melin has not attempted to estimate the number of vessels lost in the Mediterranean area.—*Nautical Gazette*, 11/5.

ATLANTIC

U-BOAT IS LIFTED OUT OF WATER BY WARSHIP'S SHELL.—The sinking of a German submarine by an American warship with a shot which lifted the U-boat completely out of the water and broke her in two, was reported by officers of the warships on their arrival here to-day. Because of the fine work of the gunners, the crew of the vessel received an additional furlough of 10 days.

On the voyage over, the warship, which previously was reported from German sources as having been wrecked, sighted three submarines and the gunners sprang to their guns. The first two shots from the warship, fired in quick succession at the nearest enemy, missed the mark, but the third went home. It caught the U-boat just below the water-line and so great was its force that the submarine was lifted out of the water. In another moment her back broke, she doubled up and sank to the accompaniment of a chorus of yells from the warship's crew.

No survivors were seen in the water and the other submarines dived, as the destroyed submersible disappeared, and they did not reappear.—*N. Y. Herald*, 11/5.

TACKLED DEADLY BOMB.—*Boatswain's Mate Probably Saved Converted Yacht From Destruction.*—How John Mackenzie, a chief boatswain's mate in the Naval Reserve, by extraordinary heroism saved the converted yacht *Remlik*, on patrol service in European waters, was told to-day in an announcement by Secretary Daniels that the Navy Department had awarded Mackenzie the medal of honor and gratuity of $100.

During a heavy gale December 17, a depth charge weighing several hundred pounds broke from its fastenings at the stern and went sweeping about the deck. As officers and crew watched the bomb, some one saw the safety pin fall out of the charge, making it a source of serious danger to the vessel and crew. Mackenzie, realizing the danger, shouted: "Watch me; I'll get it" and dashed down the deck flinging himself upon the charging cylinder.

Three times he almost had his arms about the bomb, but each time the seas tore it from him and once almost crushed him. He stuck to his task, however, and on the fourth attempt, got a firm grip on the cylinder,

heaved it upright on one of the flat ends and held it down until lines could be run to him and he and the bomb safely lashed.—*Baltimore Sun*, 29/4.

SEAPLANE CREW BATTLES SHARKS 18 HOURS.—Lieutenant Arthur Laverents, a naval aviator, and C. C. Cotton, his observer, arrived at an Atlantic port yesterday following a narrow escape from drowning and man-eating sharks last Sunday when their seaplane broke and they were forced to alight on the ocean sixty miles out from Miami, Fla.

For 18 hours the men drifted on their seaplane, acting as acrobats to prevent it from overturning when seas were rough and fighting all the time to keep sharks away. Luck was with them Monday morning, for they were sighted by an American steamship. The crew of the vessel also rescued the seaplane, which was hoisted to the deck and turned over to the naval authorities at the Atlantic port.

The story told by Lieutenant Laverents was that he and Cotton began their flight at noon last Sunday. They arose to 2000 feet. Suddenly, when 60 miles out to sea, it was discovered the engine was missing fire.

The seaplane was brought down and they tried to repair the cylinder. The gasoline tank also was leaking. Then they found they could not arise.

Sunday night was the longest either spent in their lives. Frequently huge sharks brushed against the frail craft and they had to fight them off. Finally, at six o'clock Monday morning, when they saw that the lookout in the crow's nest of the American steamship had sighted them, they were a happy pair.

Lieutenant Laverents is from Cheyenne, Wyo. He reported by wire yesterday to his commanding officer of his safe arrival and of the saving of the seaplane.—*N. Y. Herald.*

NAVY PATROL VESSEL LOST.—*The Admiral Goes on Rocks off Massachusetts Coast.*—The Navy Department is advised that the *Admiral*, scout patrol vessel No. 967, ran on the rocks off Scituate, Mass., last night, and is a total loss. All the officers and crew were saved, and considerable small material was taken off the vessel.

The *Admiral* was a converted yacht, which, before being taken over by the navy, belonged to Gordon Dexter, of Boston.—*Official Bulletin*, 27/3.

U. S. S. "ZAANLAND" SUNK IN A COLLISION AT SEA.—The Committee on Public Information issues the following:

The Navy Department is informed that the U. S. S. *Zaanland* was sunk in collision at sea on May 13. All aboard were rescued, and will be returned to the United States.

The *Zaanland* was a cargo carrier, one of the Dutch ships taken over by the United States Government, and was 8700 tons dead-weight. It was commissioned and manned by the navy for army account.—*Official Bulletin*, 17/5.

U. S. S. "PARKER" MEN PRAISED FOR "GLENART CASTLE" RESCUES.—Secretary Daniels has commended the following men of the U. S. S. *Parker* for heroism in their effort to rescue the survivors from the steamship *Glenart Castle*, which sank on February 26, 1918:

John C. Cole, quartermaster, second class, United States Naval Reserve Force, and Jonathan T. Newman, seaman, United States Navy, seeing the condition of one of the survivors, requested permission to go to his aid. Permission was granted Cole, who succeeded in swimming to the man and holding him up. The strain of holding up the man in the cold water and choppy sea nearly exhausted Cole. Newman, seeing his condition, jumped overboard, but was ordered back by the executive officer, who felt that Cole would probably be lost and that further sacrifice would be useless.

Cole held on to the survivor, and both were finally rescued.

Roy E. Hoffses, chief boatswain's mate; Francis W. Beeghley, yeoman, third class; and James H. Quinn, coxswain, United States Navy, boarded a fragile raft that was smashing into the ship's side, secured the survivors and pushed them aboard, at considerable personal risk.

David L. Morgan, electrician, third class (radio), and Thomas F. Troue, United States Navy, were constantly in the water, pulling out survivors, all of whom were totally helpless. These men have also been commended for using good judgment when necessary to take risks, and for not hesitating on any occasion.

The fourth officer of the *Glenart Castle* having fallen overboard, Wilbur W. Matthews, ship's cook, second class, and David Goldman, machinist's mate, second class, United States Navy, jumped overboard, put a line around him, and aided him to the ship's side, where he was hauled aboard.—*Official Bulletin*, 16/5.

ABROAD.—In the face of bitter winter gales, American submarines, primarily designed for operation off the home coasts, have crossed the Atlantic to engage in the common fight against German U-boats. They are now aiding allied naval forces, as are American destroyers and American naval airmen, and they have been in the war zone for some months.

Secretary Daniels revealed the fact that the submarines had gone "over there" in his address at Cleveland at a Liberty Loan celebration, but gave no details. It is now possible, however, to tell for the first time of the mid-winter passage of the boats across the seas in the face of the most severe weather known in years. In the perilous passages, the best traditions of the service have been maintained.

The first submarine left in early winter. No hint appeared in the papers, and, in fact, until Secretary Daniels spoke, no word of the participation of the under-water boats in the war against Germany had been published.

The navy had some experience with long-distance work with submarines on which to draw. Boats have been sent to the Philippines, to Hawaii and to Panama, but always in mild seasons and with plenty of time for precautionary steps.

This time, however, they were to go in a terrible winter, with the Atlantic in its ugliest mood. The steps taken to get them across cannot be disclosed, but the fact that the department has no disaster to record is pointed to as proof of their sufficiency.

In mid-December others got started. While it was fair on sailing day, ahead of the submarines a 100-mile gale was brewing. Into it they plowed, rolling and tumbling.

Even when tow lines parted in some cases, unknown to the tugs and accompanying craft, the submarines battled forward alone. A majority of them reached their destination under their own power, ready for duty.

Some of the boats were driven far from their course. They showed up at different ports, but promptly put to sea again and reached their station.

One boat was the hard luck vessel of the lot. Separated from the flotilla in the first storm and its compasses out of order, it turned homeward, only to strike two more gales in quick succession. However, it made port successfully and undamaged.

With new fuel and supplies aboard and with a man or two, worn out by the long struggle with the elements, replaced, in a few days the boat put to sea again. It went through that time, despite a fourth gale it encountered.—*Naval Monthly*, May.

U. S. TRANSPORTS CRASH.—Secretary Daniels authorized the following statement:

"Two transports, which were damaged in a collision at sea several days ago, have arrived safely at an Atlantic port. The two vessels were in a convoy and were running without lights when the accident occurred.

Neither was seriously damaged, but both were ordered to return to port for repairs. No lives are reported lost.

"A board of inquiry will be appointed to make a thorough investigation of the accident."—*Washington Evening Star*, 27/4.

LINER ESCAPES U-BOAT.—A large French transatlantic liner which arrived here to-day was unsuccessfully attacked by a submarine when two days out from a French port. The torpedo passed astern and the merchantman gave battle. Cruisers convoying the liner joined in the fight and the U-boat fled with several of the warships in pursuit.

Whether the submarine was sunk was not known by any of the 285 passengers aboard the merchantman. The attack took place while the passengers were dining at 7 o'clock at night.—*Evening Star*, 29/4.

BIG BRITISH VESSEL ROUTS A U-BOAT IN MIDOCEAN FIGHT.—A British steamship which prior to the war was considered one of the best aboard which to cross the ocean, arrived yesterday at an Atlantic port with a story of a daring attempt by a German submarine to slide under the flock of destroyers convoying her and launch a torpedo. Luckily, the periscope of the Hun craft was discovered in time and a shower of shells from the guns of the steamship caused her to hurry away.

Passengers on board the steamship said, however, that before the final plunge of the submarine she let go one torpedo when a mile away, but it went wild, showing the Huns were in great fear of death and were excited. Destroyers closed about the spot beneath which the periscope was seen, but it was unknown whether the depth bombs thrown overboard destroyed her.

The steamship was one of the several under convoy from a French port when attacked and quickly changed her course. After discharging several Canadian troops on furlough the steamship headed for an American port, where the rest of the passengers were landed. Some of these were Australians.—*N. Y. Herald*, 5/3.

SHIP'S ARMED GUARD REPORTS ENCOUNTER WITH SUBMARINE.—The Navy Department authorizes the following:

The commander of the armed guard on the steamship *Tidewater* reports to the Navy Department that on March 17, about 11.30 p. m., a submarine was sighted off the starboard bow, heading toward the vessel about 150 yards off. As the ship turned it missed the submarine by not more than 20 feet. The U-boat was then submerging. The ship's guns were brought to bear and the first shot hit some distance ahead of her wake.

"The pointer fired the second shot," says the report, "and had what the captain, the chief engineer and myself, and other members of the crew called a clean hit and was satisfied that it was effective. The third shot was fired by the boatswain's mate in charge of the after gun's crew, having her spotted and firing in the position she last submerged in. We resumed our course and commenced zigzagging, standing by for an attack, but the submarine did not appear again. We made all preparations for an attack at daybreak, but there were no signs of a submarine."—*Official Bulletin*, 8/5.

A German submarine bombarded Monrovia, Liberia.—*Army and Navy Gazette*, 20/4.

TWENTY-NINE LOST ON "FLORENCE H."—Capt. F. J. Butterfield and all the deck officers of the American steamship *Florence H.* are now believed to have lost their lives when that ship was destroyed by an explosion April 17, while off the French coast. A list of survivors received here to-day by cable from the American consul at Brest does not contain their names. It is also shown that only two of the engine-room officers escaped uninjured, the others being reported as badly burned.

A checking up of the cabled list with the record of the crew filed with the United States Shipping Commissioner here when the *Florence H.* sailed shows that out of 56 men in the civilian crew 29 are dead or missing, 12 are in hospitals badly burned, 2 are slightly burned and only 13 escaped uninjured.

There is a possibility, however, officials of the United States Shipping Board here said, that some of the missing may yet be accounted for, but as the *Florence H.* was near a port when the explosion occurred, this hope is remote. Chief Engineer James B. Watson and First Assistant Engineer Strickland are among those who escaped injury, the second and third assistants being badly burned.

In addition to the civilian crew, there were on board 23 men of a naval guard, six of whom have been reported as survivors, through the Navy Department at Washington.

The *Florence H.* sailed from Philadelphia March 30, with cargo, part of which was explosives. A recent cable advice from Paris said that the explosion was believed to have been caused by a bomb planted on the ship before she sailed.—*Baltimore Sun*, 27/4.

The American steamship *Lake Moor*, sailing on her maiden voyage with a naval gun crew aboard, was sunk by an enemy submarine in European waters about midnight April 11 and 5 officers and 39 men are missing, the Navy Department announced to-night.

Five officers, including Lieut. Commander Kinchen J. Powers, U. S. N. R. F., and 12 enlisted men have been landed at an English port.—*Baltimore Sun*, 21/4.

COLLIDES AT SEA, SINKS.—The American steamship *Westerly*, one of the new ships built by the Emergency Fleet Corporation, was sunk in a collision Sunday off the French coast, according to information received in shipping circles. All aboard were saved.

The *Westerly*, a vessel of about 5000 tons, launched on the Pacific coast in February, was returning to the United States after having completed the first half of her maiden trip to Europe.—*Evening Star*, 30/4.

AMERICAN STEAMER "TYLER" TORPEDOED AND SUNK MAY 2.—The Navy Department has received from Vice Admiral Sims a dispatch stating that the American steamer *Tyler* was torpedoed and sunk May 2, 1918, in European waters. Survivors of the vessel were landed at a French port. Six of the merchant crew, including the third assistant engineer, and five members of the naval armed guard were lost.—*Official Bulletin*, 8/5.

NOTE.—The names of the members of the armed guard on the *Tyler* are being checked up by the Bureau of Navigation, and will be made public as soon as this is completed.

STEAMER "NECHES" SUNK BY TORPEDO, RETURNING WITHOUT CARGO, BUT ALL ON BOARD REPORTED SAFE.—The following statement is authorized by the Secretary of the Navy:

The War Department has received information that the *Neches*, a cargo carrier of 7175 tons, was torpedoed and sunk on the night of May 14 or early morning of May 15.

All on board are reported saved.

The vessel was returning without cargo.

It is believed that the vessel carried a crew of about 125 men.

No troops were on board.

The *Neches* was under charter by the United States Shipping Board. It was a steel ship, built in 1914, and had a speed of about 14 knots per hour. —*Official Bulletin*, 11/5.

MYSTERIOUS ADVERTISEMENT IN A SOUTH AMERICAN NEWSPAPER HINTS THE "CYCLOPS" WAS SUNK.—A story has been brought to the United States to the effect that, two weeks after the United States collier *Cyclops*, which has been given up as lost, left Barbados, on March 4, an advertisement was published in a Portuguese newspaper at Rio Janeiro announcing a requiem mass would be celebrated for the repose of the soul of Alfred L. Moreau Gottschalk, "lost when the *Cyclops* was sunk at sea." The story was brought by a British steamship arriving yesterday at an Atlantic port from Brazil.

Especial interest attaches to the advertisement, as it was published long before the United States Navy Department at Washington, on April 15, announced that the collier, with an immensely valuable cargo of manganese and 333 persons on board, was missing.

Efforts have continued since the appearance of the advertisement by the United States and Brazilian secret agents to discover the identity of the persons responsible for the advertisement, as it is believed they possessed information that the *Cyclops* never would reach the American port for which she was bound when she left Rio de Janeiro.—*N. Y. Herald*, 6/5.

SECRETARY DANIELS STILL HOPES TO FIND THE "CYCLOPS."—Although two months have passed since the naval collier *Cyclops* disappeared, Josephus Daniels, Secretary of the Navy, said to-day the department still holds hopes of solving the mystery, and has not yet officially recorded the vessel as "lost."

Systematic questioning of fishermen and residents of islands along the route the collier would have followed from the West Indies to an Atlantic port is continuing.—*N. Y. Herald*, 15/5.

ONE FRENCH GUNNER DEFEATS HUN U-BOAT.—Heroism of French sailors, of which so little has been learned during the war, is told with the official story of the French sailing patrol boat *Goeland II*.

During one of the blackest nights of January the *Goeland II* suddenly found herself under the point-blank fire of the two guns of a German submarine. Despite the fact that the ship was torn open beyond repair, the crew rushed to their single gun and went into action. Two gunners were killed before a shot was fired from the ship; a third calmly worked the gun alone and his second shell put the submarine's rear gun out of action. The U-boat then submerged and gave up the fight.

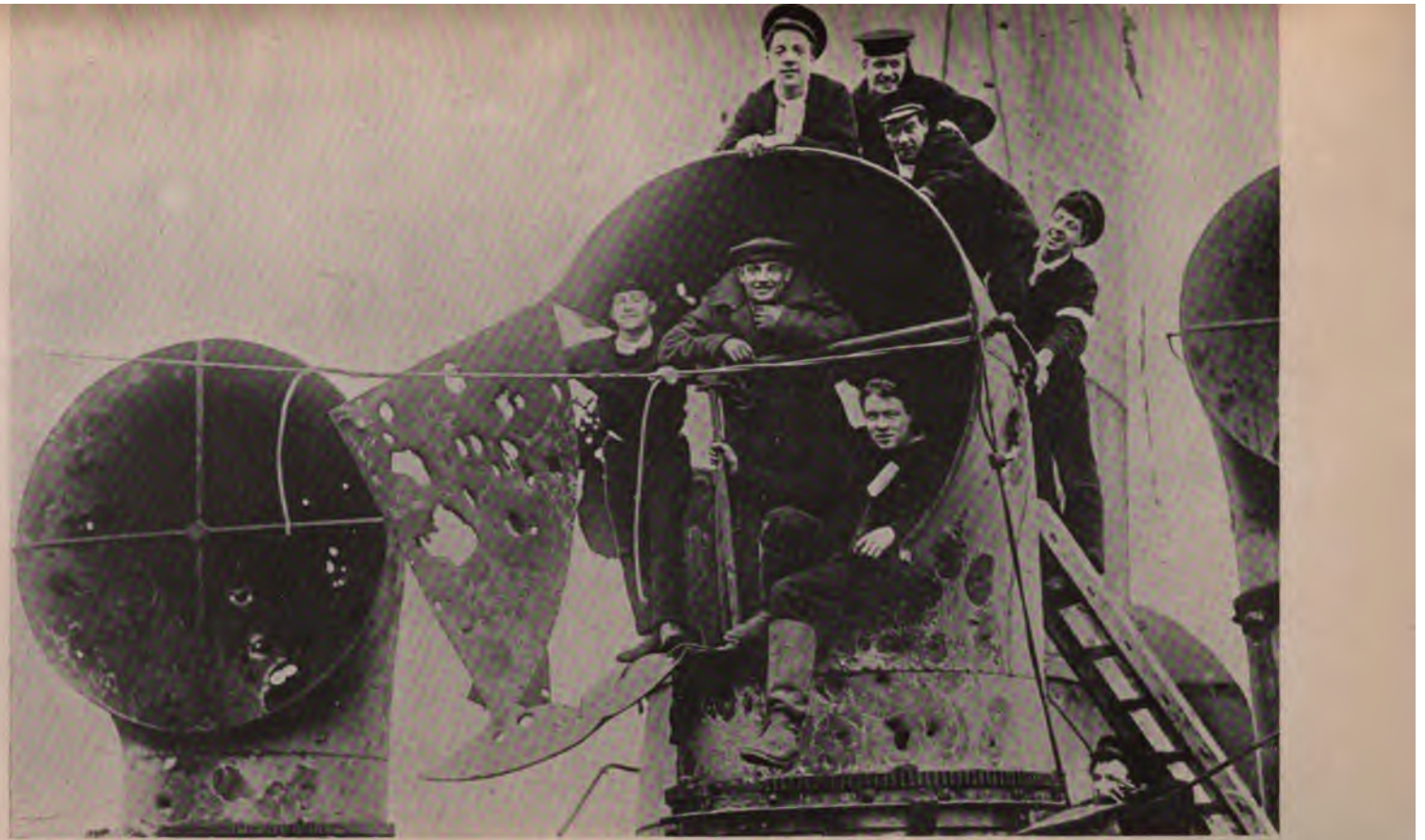
The *Goeland II* sank and with her the captain. The second mate, gravely wounded, directed the remaining men of the crew into the boats which were floating where the ship disappeared.

The Minister of Marine has endowed the brave second mate and the third gunner with the Military Medal and cited the deed to the Order of the Army.—*Baltimore Evening Sun*, 27/4.

BIG LINER "ST. PAUL" OVERTURNS AT PIER.—The American line steamship *St. Paul* overturned while being warped around her pier here to-day, after coming from a nearby dry dock. It is believed that all persons on board, between 500 and 600 workmen, escaped, but as the vessel lies two-thirds submerged, with her bow on the bottom and her stern high in the air, the military authorities were unwilling to announce that no one perished. It was considered possible that some of the men might have been caught in the interior of the ship and drowned.

Whether the *St. Paul's* seacocks were left open or the ballast shifted, remains to be determined.

The *St. Paul*, one of the crack steamships of the American line, registers 11,629 tons gross. For many years she has been in transatlantic service, and during the war has taken to Europe and brought back as passengers many noted persons.—*Evening Star*, 25/4.



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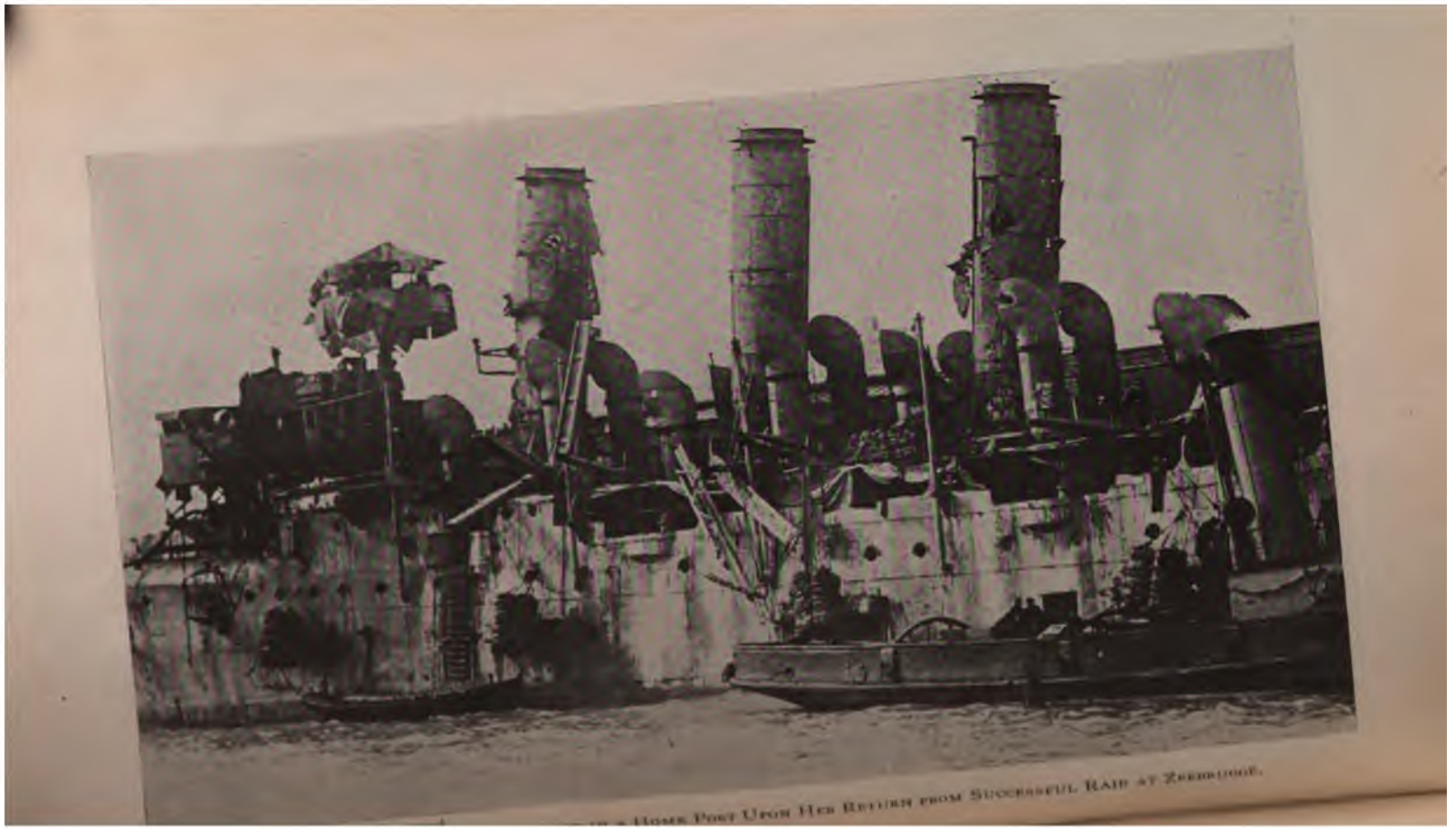
CRUISER "VINDICTIVE" BATTERED BY GERMAN SHELLS AT ZEEBRUGGE, NOW SUNK ACROSS OSTEND CHANNEL.



Homs Post Upon Her Return from Successful Raid at Zeebrugge.

RAISING THE "ST. PAUL."—An ash port carelessly left open was believed to have flooded the American liner *St. Paul*, sinking her at her pier. However, so far no official announcement as to the cause of the accident, which probably caused the loss of lives, has been made.

Work of raising the vessel is progressing rapidly to-day. Meanwhile investigation to definitely place the responsibility for the sinking was conducted by army men.—*Baltimore Evening Sun*, 26/4.

NORTH SEA AND CHANNEL

GERMAN SHIPS SHELL COAST OF FLANDERS.—German torpedo craft bombarded the coast between Dunkirk and Nieuport, behind the allied lines in Flanders, yesterday morning, says an official statement from Berlin to-day. The text reads:

"Our torpedo-boats on Thursday morning fired 600 shells on enemy camps and storage places between Dunkirk and Nieuport."—*N. Y. Herald*, 20/4.

KATTEGAT SWEPT BY BRITISH SHIPS.—*Ten German Trawlers Sunk.*—The Secretary of the Admiralty made the following announcement last evening: Commander-in-Chief, Grand Fleet, reports having undertaken a sweep of the Kattegat on April 15.

Ten German trawlers were sunk by gun-fire, their crews being saved by the British ships.

There were no British casualties.

Reported Fight Near the Sound.—Copenhagen, April 15.—During the last few days numerous torpedo-boats and destroyers of foreign nationality have been observed at different places off the Swedish west coast near Halmstad (in the Kattegat). This morning six destroyers were seen firing at a sailing vessel, which at last took fire. Farther out at sea smoke and flames were seen, and about 100 shots were heard.

A special telegram from Helsingborg to *National Tidende* states that a fight has taken place between English and German vessels in the Kattegat northwest of Kullen (at the northern entrance of the Sound). A number of German trawlers are said to have been sunk. German battleships then came up, and the fight continued.

Enemy Vessels in Flames.—Christiania, April 15.—A correspondent of *Aftenposten* reports from Gothenburg that destroyers of foreign nationality were observed at 5.30 this morning eight miles off the Swedish coast shelling five ships which looked like German trawlers, and which all seemed to be ablaze, while some were about to sink. At 10.50 Marstrand fishermen saw the warships speeding rapidly northwest.—*London Times*, 18/4.

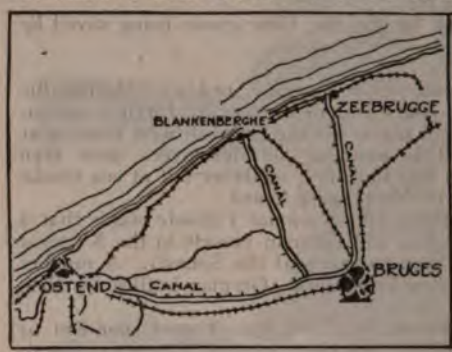
BRITISH AND GERMAN LIGHT NAVAL FORCES IN A SHORT BATTLE NEAR HELIGOLAND.—British and German light forces clashed on Saturday in the waters east of the great German fortress Heligoland, the British Admiralty announced to-day. After the exchange of a few shots at long range, the German warships took refuge behind their mine-fields. The Admiralty announcement says:

"British light forces operating in Heligoland Bight Saturday obtained touch with enemy light forces, who retired behind the mine-fields. A few shots were exchanged at an extreme range. One enemy destroyer was observed to be hit. All our ships returned without casualties."—*N. Y. Herald*, 22/4.

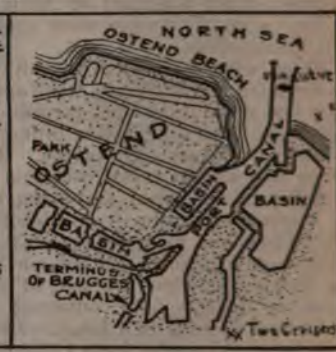
THE ATTACK ON ZEEBRUGGE AND OSTEND.—Those critics who have been calling for a strong offensive against the German submarine bases must have received their fill of satisfaction when they read of the dashing exploit of the British Navy against the German bases at Zeebrugge and Ostend. Germany could not have been struck in a more tender spot; for her writers, both military and naval, have always tried to impress it upon the Germans that the possession of the Belgian c[illegible]ine

importance in Germany's plans for the crushing of British sea power. German hunger for the possession of the Channel ports is largely responsible for the present fierce drive against the northern sectors of the British Army in France, and should she succeed in adding Dunkirk, Calais and Boulogne to Zeebrugge and Ostend, she will fight to retain them more fiercely perhaps than for any other object in the war.

The value of the two Belgian harbors lies in their strategic relation to the English Channel and the southerly half of the North Sea. Zeebrugge is the port of the considerable city of Bruges, with which it is connected by a canal which also extends between Bruges and Ostend. These conditions render both of these ports admirable bases for submarine operations; for the craft can lie in the canal beyond range of hostile gun-fire from the sea. The approaches to both ports are characteristic of the waters of the Belgian coast, which are shoal and underlaid by shifting masses of sand through which channels lead from deep water to the harbor entrances. Zeebrugge is protected from southwest gales by a curved breakwater or mole of masonry, which is connected, at its in-shore end, with the mainland by a bridge. The entrance to the docks of the canal is formed by two smaller breakwaters with a lighthouse at the end of each. About three-quarters of a mile in-shore are the lock gates which form the entrance to the docks and to the canal.



RELATION OF OSTEND AND ZEEBRUGGE TO BRUGES.



OSTEND, SHOWING ENTRANCE AND DOCKS.

From *Scientific American* and *London Times*.

Ostend has no large breakwater, the entrance to the docks and to the canal from the sea being formed by two piers, about one-quarter and one-half mile in length, and the harbor being a tidal one, there are the customary lock gates leading to the various docks and basins.

Both Zeebrugge and Ostend have been subjected to attack from the air by the British Naval Airplane Service, and considerable damage has been done from time to time. Latterly, as protection, the Germans have built heavy reinforced concrete shelters, under which the submarines lie during their overhauling and refitting.

The expedition, which was under the command of Admiral Keyes, was most carefully organized; and the various vessels that went into the harbor were manned entirely by volunteer crews. There is some doubt as to the exact composition and size of the attacking fleet, but judging from the rather fragmentary reports which have come to hand, it looks as though the fleet of raiding ships was accompanied by a considerable force of monitors armed with 12- and 14-inch guns which subjected both bases to heavy long-range gun-fire before the raiding vessels were sent in.

The fleet detailed for the raid consisted of five obsolete cruisers from 20 to 30 years old; the *Vindictive* under command of Commander Car-

penter; two large ferryboats which formerly did service between Birkenhead and Liverpool; two old submarines filled with explosives; and several destroyers and high-speed motor-boats.

The *Vindictive* is a protected cruiser of 5750 tons and 20 knots speed, built in 1897, mounting a battery of ten 6-inch guns, and nine 12-pounders. Her complement is 450 men.

The five obsolete cruisers, loaded down with masses of concrete, were designed to be sunk across the channel entrances so as completely to block them.

The two old submarines, which were crammed with explosives, were destined, one for blowing up the bridge connecting the in-shore end of the mole with the mainland, and the other for blowing up the lock gates, and so draining the docks and basins and the canal itself.

ZEEBRUGGE HARBOR.
From *Scientific American* and *London Times*.

The plan of attack was for the *Vindictive* and the two large ferryboats to lie alongside the outer wall of the mole and throw landing parties ashore, mainly for the purpose of diverting attention from what was being done inside the harbor, and partly for the purpose of destroying the batteries and the considerable amount of military stores located on the mole. Under the cover of this destruction, three of the concreted cruisers were to make their way through the harbor and sink themselves squarely across the channel.

After the preliminary bombardment by the monitors, which was so heavy that windows were shaken in the town of Dover, some 75 miles distant, the fleet advanced behind a screen of smoke. A change in the wind lifted the smoke screen just before the fleet reached its objective, and German star shells revealed to the enemy the daring nature of the attack. The *Vindictive* reached her objective, and with lines of grappling irons managed to get ashore two out of 14 special gangways—the other dozen having been shot away—which were stretched from the ship to the elevated parapet of the mole. Over these the crew from the *Vindictive* swarmed

barges which defends the channel from the tip of the mole, but had the ill-fortune to foul one of her propellers upon the net defence which flanks it on the shore side. The propeller gathered in the net and rendered her practically unmanageable; the shore batteries found her and pounded her unremittingly; she bumped into a bank, edged off and found herself in the channel again, still some hundreds of yards from the mouth of the canal, in a practically sinking condition. As she lay she signalled invaluable directions to the others, and here Commander R. S. Sneyd, D. S. O., accordingly blew the charges and sank her. A motor launch under Lieutenant H. Littleton, R. N. V. R., raced alongside and took off her crew. Her losses were five killed and five wounded.

Intrepid, smoking like a volcano and with all her guns blazing, followed; her motor launch had failed to get alongside outside the harbor, and she had men enough for anything. Straight into the canal she steered, her smoke blowing back from her into *Iphigenia's* eyes, so that the latter, blinded and going a little wild, rammed a dredger with a barge moored beside it which lay at the western arm of the canal. She got clear, though, and entered the canal pushing the barge before her. It was then that a shell hit the steam connections of her whistle, and the escape of steam which followed drove off some of the smoke and let her see what she was doing.

Lieutenant Stuart Bonham-Carter, commanding the *Intrepid*, placed the nose of his ship neatly on the mud of the western bank, ordered his crew away and blew up his ship by the switches in the chart-room. Four dull bumps was all that could be heard, and immediately afterwards there arrived on deck the engineer, who had been in the engine-room during the explosion, and reported that all was as it should be.

Lieutenant E. W. Billyard-Leake, commanding *Iphigenia*, beached her according to arrangement on the eastern side, blew her up, saw her drop nicely across the canal, and left her with her engines still going to hold her in position till she should have bedded well down on the bottom. According to the latest reports from air observation, the two old ships, with their holds full of concrete, are lying across the canal in a V position; and it is probable that the work they set out to do has been accomplished and that the canal is effectively blocked.

A motor-launch under Lieutenant P. T. Deane, R. N. V. R., had followed them in to bring away the crews, and waited farther up the canal towards the mouth against the western bank. Lieutenant Bonham-Carter, having sent away his boats, was reduced to a Carley float, an apparatus like an exaggerated lifebuoy with a floor or grating. Upon contact with the water it ignited a calcium flare, and he was adrift in the uncanny illumination with a German machine-gun a few hundred yards away giving him its undivided attention. What saved him was possibly the fact that the defunct *Intrepid* was still emitting huge clouds of smoke which it had been worth nobody's while to turn off. He managed to catch a rope as the motor-launch started and was towed for a while till he was observed and taken on board.

Another officer jumped ashore and ran along the bank to the launch. A bullet from the machine-gun stung him as he ran, and when he arrived, charging down the bank out of the dark, he was received by a member of the launch's crew, who attacked him with a hammer.

The whole harbor was alive with small craft. As the motor-launch cleared the canal and came forth to the incessant geysers thrown up by shells, rescuers and rescued had a view of yet another phase of the attack. The shore end of the mole consists of a jetty, and here an old submarine, commanded by Lieutenant R. D. Sandford, R. N., loaded with explosives, was run in to the piles and touched off, her crew getting away in a boat to where the usual launch awaited them. Officers describe the explosion as the greatest they ever witnessed—a huge roaring spout of flame that tore the jetty in half and left a gap of over 100 feet. The claim of another launch to have sunk a torpedo-boat alongside the jetty is supported by many

observers, including officers of the *Vindictive*, who had seen her mast and funnel across the Mole and noticed them disappear.

Meantime the destroyers *North Star*, *Phœbe*, and *Warwick*, which guarded the *Vindictive* from action by enemy destroyers while she lay beside the mole, had their share in the battle. *North Star*—Lieut. Commander K. C. Helyar, R. N.—losing her way in the smoke, emerged to the light of the star shells, and was sunk. The German *communiqué* which states that only a few members of the crew could be saved by them is in this detail of an unusual accuracy; for the *Phœbe*—Lieut. Commander H. E. Gore-Langton, R. N.—came up under a heavy fire in time to rescue nearly all. Throughout the operation monitors and the siege guns in Flanders manned by the Royal Marine Artillery heavily bombarded the enemy's batteries.

The wind that blew back the smoke-screen at Zeebrugge served us even worse off Ostend, where that and nothing else prevented the success of an operation ably directed by Commodore Hubert Lynes, C. M. G. The coastal motor-boats had lit the approaches and the ends of the piers with calcium flares and made a smoke cloud which effectually hid the fact from the enemy *Sirius* and *Brilliant* were already past the stream bank buoy when the wind changed, revealing the arrangements to the enemy, who extinguished the flares with gun-fire.

The *Sirius* was already in a sinking condition, when at length the two ships, having failed to find the entrance, grounded and were forced, therefore, to sink themselves at a point about 400 yards east of the piers, and their crews were taken off by motor-launches under Lieutenant K. R. Hoare, R. N. V. R., and Lieutenant R. Bourke, R. N. V. R.

The motor-launches here were under the command of Commander Hamilton Benn, R. N. V. R., D. S. O., M. P., while those at Zeebrugge were commanded by Captain R. Collins, R. N. (the vice admiral's flag captain). All the coastal motor-boats were commanded by Lieutenant A. P. Wellman, D. S. O., R. N. The torpedo-boat destroyer flotilla was commanded by Captain Wilfred Tomkinson, R. N.

The difficulty of the operations is to be gauged from the fact that from Zeebrugge to Ostend the enemy batteries number not less than 120 heavy guns, which can concentrate on retiring ships, during daylight, up to a distance of about 16 miles.—*London Times.*

ATTACK ON ZEEBRUGGE BASE DECLARED COMPLETE SUCCESS.—The Associated Press learns from a high naval source that the operations at Zeebrugge were a complete success, with the result that the Flanders flotilla now will be obliged to resort to the Ostend route in putting to sea, from which the British forces can more easily handle the German ships.

In addition to the damage done, the mole and the German guns, material and shipping, the channel has been blocked by the cement ships and a German dredger was destroyed.

The loss of the dredger, together with the blocking up of the channel, must result in the speedy silting up of the waterway, and it will take at least several weeks to clear the passage.

Reuter's Amsterdam correspondent sends the following telegram, received from Berlin:

"The Kaiser on Tuesday visited Zeebrugge, the scene of the frustrated English raid. He boarded the mole, where he convinced himself that the damage caused by the blowing up of the railway bridge had already been temporarily repaired and that a final bridging of the gap can be done in a few days. He also satisfied himself of the perfectly good condition of all the structures and installations on the outer part of the mole, which was the objective of the attack."

To Discipline German Admiral.—Vice Admiral Schroeder, the commander at Zeebrugge, according to reports reaching here, will be deprived of his command for being taken by surprise by the British Tuesday. Ger-

man newspapers, in commenting on raid at Zeebrugge, generally, take the hint given in the official reports at Berlin and represent the enterprise as having been a failure. Some, however, admit that the attack was made with great boldness.

The *Lokal Anzeiger* says that the raiders succeeded in blocking the waterway to a great extent, but that the U-boats still are able to leave their harbor, as a narrow passage remains.—*Evening Star*, 26/4.

SAYS AMERICANS PARTICIPATED IN ZEEBRUGGE RAID.—Scouting by American aviators of both the army and navy played an important part in the British raid on the German submarine base at Zeebrugge, according to an American naval officer who arrived at an Atlantic port aboard a French steamship yesterday.—*N. Y. Herald*, 8/5.

BRITISH LOST 588 IN RAID.—The total British casualties in the operations on Tuesday against Zeebrugge and Ostend were 588, according to an official announcement to-night. These were divided as follows:

Officers.—Killed, 16; died of wounds, 3; missing, 2; wounded, 29.

Men.—Killed, 144; died of wounds, 25; missing, 14; wounded, 355.—*N. Y. Herald*, 28/4.

STORY OF SINKING OLD "VINDICTIVE" AT OSTEND.—London, May 14.—The Admiralty has issued the following graphic story of the Ostend operation:

"Dunkirk, May 11.—The *Sirius* lies in the surf some 2000 yards east of the entrance to Ostend harbor, which she failed so gallantly to block, and when in the early hours of yesterday morning the *Vindictive* groped her way through the smoke screen and headed for the entrance it was as though the old fighting ship awoke and looked on.

"A coastal motor-boat had visited her and hung a flare in her slack and rusty rigging, and that eye of unsteady fire, paling in the blaze of star shells, or reddening through the drift of smoke, watched the whole great enterprise from the moment when it hung in doubt to its ultimate triumphant success.

"The planning and execution of that success had been intrusted by Vice Admiral Sir Robert Keyes to Commodore Hubert Lynes, who directed the previous attempt to block the harbor with the *Sirius* and *Brilliant*. Upon that occasion a combination of unforeseen and unforeseeable conditions had fought against him.

"Upon this the main problem was to secure the effect of a surprise attack upon an enemy who was clearly, from his ascertained dispositions, expecting him. The *Sirius* and *Brilliant* had been baffled by the displacement of the Stroom bank buoy, which marks the channel to the harbor entrance. But since then aerial reconnaissance had established that the Germans had removed the buoy altogether and that there now were no guiding marks of any kind. They also had cut gaps in the piers as a precaution against a landing, and, further, when toward midnight Thursday the ships moved from their anchorage, it was known that some nine German destroyers were out and were at large upon the coast.

"The solution of the problem is best indicated by the chonicle of events. It was a night that promised well for the enterprise—nearly windless—and what little breeze stirred came a point or so west of north. The sky was lead blue, faintly star-dotted, with no moon, and a still sea for small craft, motor-launches and coastal motor-boats, whose work was done close inshore.

"From the destroyer which served the commodore for a flagship, the remainder of the force were visible only as silhouettes of blackness—the destroyers looming like cruisers in the darkness, the motor-boats like destroyers and the coastal motor-boats showing themselves as racing hillocks of foam.

"From Dunkirk a sudden, brief flurry of gun-fire announced that German airplanes were about. They were actually on the way to visit Calais, and over the invisible coast of Flanders the summer lightning of restless artillery rose and fell monotonously.

"'There's the *Vindictive!*' The muffled seamen and marines standing by the torpedo tubes and guns turned at that name to gaze at the great black ship, seen mistily through the screening smoke from the destroyers' funnels, plodding silently to her goal and end. Photographs had made familiar that high-sided profile, her tall funnels with Zeebrugge scars, always with the background of the pier at Dover, against which she lay to be fitted for her last task. Now was added to her the environment of night and sea and the greatness of the tragedy of her mission.

"She receded into the night astern, as a destroyer raced on to lay a light buoy that was to be her guide, and those on board saw her no more. She passed thence into the hands of the small craft whose mission was to guide her, light her and hide her in the clouds of a smoke screen.

"There was no preliminary bombardment of the harbor and batteries, as before the previous attempt. That was to be the first element in the surprise. A time table had been laid down for every stage of the operation, and the staff work beforehand even included precise orders for laying the smoke barrage, with plans calculated for every direction of the wind.

"Monitors anchored in firing positions far seaward awaited the signal. The great sea batteries of the Royal Marine Artillery in Flanders, among the largest guns that were ever placed on land mountings, stood by likewise to neutralize the big German artillery along the coast, and the airmen who were to collaborate with an aerial bombardment of the town, waited somewhere in the darkness overhead. Destroyers patrolled to seaward of the small craft.

"The *Vindictive*, always at that solemn gait of hers, found the flagship's light buoy and bore up for where a coastal motor-boat commanded by Lieutenant William R. Slayter was waiting by a calcium flare upon the old position of the Stroom bank buoy.

"Four minutes before she arrived there, and 15 minutes only before she was due at the harbor mouth, the signal for the guns to open was given. Two motor-boats under command of Lieutenant Albert L. Poland dashed in toward the ends of the high wooden piers and torpedoed them. There was a machine gun on the end of the western pier, and that vanished in a roar and leap of flames—which called to the guns.

"Over the town a flame suddenly appeared high in the air and sank slowly earthwards, the signal that the air-planes had seen and understood. Almost coincidentally with their first bombs came the first shells, whooping up from the monitors at sea. The surprise part of the attack was sprung. The surprise, despite the German's watchfulness, seems to have been complete. Up until the moment when the torpedoes of the motor-boats exploded there had not been a shot from the land—only occasional routine star shells.

"The motor-launches were doing their work magnificently. These pocket warships manned by officers and men of the Royal Naval Volunteer Reserve are specialists at smoke production. They built to either hand of the *Vindictive's* course the likeness of a dense sea mist, driving landward with the wind. Star shells paled and were lost as they sank in it; the beams of searchlights seemed to break off short upon its front. It blinded the observers in the great batteries, which suddenly, upon the warning of the explosions of guns, roared into action.

"There was a while of tremendous uproar. The coast about Ostend is ponderously equipped with batteries, each with a name known and identified as Von Tirpitz, Von Hindenberg, Deutschland, Cecilia and the rest. They register from six inches to monsters of 15-inch naval pieces in land turrets, and the Royal Marine Artillery fights a war-long duel with

them. These now opened fire into the smoke and over it at the monitors and marines, and the monitors replied.

"Meanwhile the airplanes were bombing methodically and anti-aircraft guns were searching the skies for them. Star shells spouted up and floated down, lighting the smoke banks with spreading green fires, and those strings of luminous green balls which the airmen called 'flaming onions' soared up, to lose themselves in the clouds.

"Through all this stridency and blaze of conflict the old *Vindictive*, still unhurrying, was walking the lighted waters toward the entrance. It was then that those on the destroyers became aware that what seemed to be merely smoke was wet and cold; that the rigging was beginning to drip, and that there were no longer any stars. A sea fog had come on.

"The destroyers had to turn on their lights and use their sirens to keep in touch with each other. The air attack was suspended and the *Vindictive*, with some distance yet to go, found herself in gross darkness. There were motor-boats on either side of her, escorting her to the entrance. These were supplied with what are called Dover flares, enormous lights capable of illuminating square miles of sea. At once every pistol was fired as a signal to light these, but the fog and smoke together were too dense for even the flares.

"The *Vindictive* then put her helm over and started to cruise to find the entrance. Twice she must have washed across, and at the third turn, upon reaching the position at which she first lost her way, there came a rift in the mist and she saw the entrance and the piers on either side and an opening dead ahead.

"The inevitable motor-boat, *U P 22*, commanded by Acting Lieutenant Guy L. Cockburn, raced on into the opening under heavy and momentarily growing fire and planted a flare on the water between the piers. The *Vindictive* steamed over it and on. She was in.

"The guns found her at once. She was hit every few seconds after she entered, her scarred hull broken afresh in a score of places, her decks and upper works swept by machine guns. The machine gun at the end of the western pier had been put out of action by a motor-boat's torpedo, but from other machine guns at the inshore end of the pier from a position on the front and from machine guns apparently firing over the eastern pier there converged upon her a hail of lead.

"After her control was demolished by a shell which killed all the occupants, including Sublieutenant Angus H. MacLachan, who was in command of it, the upper and lower bridges and the chart-room, swept by bullets, Commander Godsal ordered the officers to go with him in the conning-tower. They observed through the observation slit in the steel wall of the conning-tower that the eastern pier was breached some 200 yards from the seaward end as though at some time a ship had been in collision with it. They saw the front of the town silhouetted again and again in the light of the guns that blazed at them. The night was a patchwork of fire and darkness.

"Immediately after passing the breach in the pier Commander Godsal left the conning-tower and went on deck the better to watch the ship's movements. He chose a position and called in through the slit of the conning-tower his order to starboard the helm. The *Vindictive* responded and laid her battered nose to the eastern pier and prepared to swing her length across the channel.

"It was at that moment that a shell from the shore batteries struck the conning-tower. Lieutenant Sir John Alleyne and Lieutenant V. A. C. Crutchley were still within. Commander Godsal was close to the tower outside. Lieutenant Alleyne was stunned by the shock. Lieutenant Crutchley shouted through the slit to the commander, and, receiving no answer, rang for the port engine full speed astern to help the swinging ship. By this time she was lying at an angle of about 40 degrees to the pier and seemed to be hard fast, so it was impossible to bring her farther around.

"After working the engines some minutes to no effect, Lieutenant Crutchley gave the order to clear the engine room and abandon ship, according to the program previously laid down. Engineer Lieut. Commander Williarm A. Bury, who was the last to leave the engine room, blew the main charges by a switch installed aft. Lieutenant Crutchley blew the auxiliary charges in the forward 6-inch magazine from the conning-tower.

"Those on board felt the old ship spring as the explosive tore the bottom plates and bulkheads from her. She sank about six feet and lay upon the bottom of the channel. Her work was done.

"It is to be presumed that Commander Godsal was killed by the shell which struck the conning-tower. Lieutenant Crutchley, searching the ship before he left her, failed to find his body or that of Sublieutenant MacLachlan in that wilderness of splintered wood and shattered steel. In the previous attempt to block the port Commander Godsal commanded the *Brilliant*, and together with all the officers of that ship and of the *Sirius* had volunteered at once for the further operation.

"Engineer Lieut. Commander Bury, who was severely wounded, and had been in the *Vindictive* in the attack on Zeebrugge mole. He had urged upon the vice admiral his claim to remain with her and with four engine-room artificers, in view of his and their special knowledge of her engines.

"The names of these four are A. Cavanagh, H. M. S. *Vindictive*, wounded; M. Caroll, royal naval barracks, Chatham, wounded; A. Thomas, H. M. S. *Lion*, missing; H. Harris, H. M. S. *Royal Sovereign*.

"The coxswain was a first-class petty officer, J. J. Reed, royal naval barracks, Chatham, who had been with Commander Godsal in the *Brilliant*, and whose urgent request that he be allowed to remain with him had been granted. The remainder of the crew were selected from a large number of volunteers from the ships of the Dover patrol.

Most of the casualties were incurred while the ship was being abandoned. The men behaved with just that cheery discipline and courage which distinguished them in the Zeebrugge raid. Petty Officer Reed found Lieutenant Alleyne in the conning-tower still unconscious, and carried him aft under a storm of fire from machine guns. Lieutenant Alleyne was badly hit before he could be got over the side and fell into the water. Here he managed to catch hold of a boat, and a motor-launch under Lieutenant Bourke succeeded in rescuing him and two other wounded men.

"The remainder of the crew were taken off by a motor-launch under Lieutenant Geoffrey H. Drummond under a fierce fire. When finally he reached the *Warwick* the launch was practically in a sinking condition; her bows were shot to pieces. Lieutenan Drummond himself was severely wounded. His second in command, Lieutenant Gordon Ross, and one hand were killed. A number of others were wounded. The launch was found too damaged to tow. Day was breaking and she and the *Warwick* were in easy range of the forts. As soon as her crew and the *Vindictive* survivors were transferred a demolition charge was placed in her engine room and she was sunk.

"All was according to program. Recall rockets for the small craft were fired from the flagship at 2.30 a. m. Great red rockets whizzed up, to lose themselves in the fog. They could not have been visible half a mile away, but the work was done and one by one the launches and motor-boats commenced to appear from the fog and stopped their engines alongside. The destroyers exchanged news with them. There were wounded men to be transferred and dead men to be reported. But no one had seen a single enemy craft. Nine German destroyers which were out, free to fight, had chosen the discreeter part.

"Vice Admiral Sir Roger Keyes was present at the operation on the destroyer *Warwick*. Commander Hamilton Benn, N. V P., D. S. O., M. P., was in command of the motor-launches, and Lieutenant Francis

C. Harrison, R. N., D. S. O., was in charge of the coastal motor-boats. The central smoke screen was intrusted to Sublieutenant Humphrey V. Low and Sublieutenant Leslie R. Blake. The casualties, as at present reported, stand at two officers and six men killed; two officers and ten men, all of the *Vindictive*, missing and believed killed and four officers and eight men wounded.

"It is not claimed by the officers who carried out the operations that Ostend harbor is completely blocked. But its purpose to embarrass the enemy and make the harbor impracticable to any but small craft and for dredging operations difficult has been fully accomplished. The position of the *Vindictive* is with stem on to the eastern pier, and not her stern, as shown in certain published illustrations."—*Washington Evening Star*, 14/5.

BRITISH SUBMARINES HAVE TORPEDOED 40 HUN WARSHIPS.—*Two German Dreadnoughts Included in Official Review Received Here.*—More than 40 German warships have been attacked successfully by British submarines.

This was disclosed by an official British statement received her and made public to-day by the Committee on Public Information. The review was the most extensive ever received in this country of the work of the British under-water craft, concerning the activities of which little news has reached America since their famous raids in the Dardanelles and the Baltic Sea.

Most of the battles narrated in the review were with German destroyers which had sallied forth, presumably on raiding expeditions, but in one instance a submarine commander told of sighting four dreadnoughts of the *Kaiser* class off the Dutch coast and of discharging torpedoes at two of them. The submarine submerged as the torpedoes were fired, but from the sounds of explosions which the commander heard he concluded that two of the battleships were hit. The submarine was prevented by German destroyers from rising to the surface to observe the effects of its attack.—*N. Y. Herald*, 9/5.

GREAT MINE-FIELD IN NORTH SEA.—According to Archibald Hurd, in the London *Daily Telegraph*, the area in the North Sea, recently announced by the British Government as prohibited, as dangerous to shipping after May 15, will be the greatest mine-field ever laid for the special purpose of foiling submarines. It will embrace 121,782 square miles, the base forming a line between Norway and Scotland and the peak extending northward into the Arctic Circle.

Archibald Hurd, who is an authority on naval subjects, says that there has been a vast improvement in British mines since Admiral Jellicoe became First Sea Lord. Hurd points out that the creating of this barrier across the northern exit of the North Sea was an enormous task, involving 12 or more months, and estimates that tens of thousands of mines were required to cover the area. He suggests that when Admiral Jellicoe made his famous prophecy that the submarine menace would be met by August, that he had this mine-field in mind.—*Nautical Gazette*, 11/5.

GERMAN NAVAL ACTIVITIES.—No German war vessel larger than a destroyer has shown itself 150 miles west of Heligoland from August, 1916, to October, 1917, when two light cruisers attacked the Scandinavian convoy." That statement continues to present a picture of the state of affairs in the North Sea, although how soon it may be varied no one can attempt to predict. In spite of the strength of the High Seas Fleet, it is seldom indeed that any attempt is made to show the German flag in what was once called the "German Ocean," whereas at all times the British Fleet not only controls the communications in those waters, but sweeps them from end to end and right up to the enemy's mine-fields and the approaches to his fort-defended waters.—*Army and Navy Gazette*, 20/4.

U-BOAT AND MINE SINK SLOOP AND TRAWLER.—*Fifteen British Crew Men Missing. Eight Swedes Are Killed.*—London, May 12.—The Admiralty announces that a British mine-sweeping sloop was torpedoed and sunk by a German submarine, May 6. Two officers and 13 men are missing and are presumed to have been drowned.

A dispatch to the *Exchange Telegraph* from Copenhagen says the German mine-field north of Gothenburg has brought disaster to the large Swedish trawler *Agnes*, which struck a mine betweeen Vingaa and Scalv. The trawler sank immediately. Eight Swedes on board were killed. Only two of the ship's company were saved.—*Evening Star*, 13/5.

SUBMARINES SUNK.—*Work of the R. N. A. S.—Attacks By Seaplanes.*—Instances of the successful work of the Royal Naval Air Service wherever our naval and military forces are operating were given in *The Times* of Saturday, and it is now possible to record some of the splendid services which this branch of our navy has rendered to the Empire by destroying enemy submarines.

While on patrol in the Channel, seaplane *X* sighted a submarine eight miles away, in the line of convoy which was about 10 miles off. When the seaplane reached bombing position, the top of the conning-tower was just awash, and both periscopes were out of the water. Two large bombs were released, the first of which exploded on the conning-tower, and the periscopes were seen to collapse. The second bomb hit the water 30 feet ahead of the conning-tower, in a direct line with the bow of the submarine. The seaplane then turned, and a considerable disturbance was seen on the surface—an upheaval of water, with quantities of air rushing up. Two other bombs were dropped from a height of 1000 feet, one of which exploded in the midst of the disturbance.

A Shoal of U-boats

One of our large seaplanes the other morning sighted an enemy submarine, painted light grey, with a mast and a gun on what appeared to be a raised deck. By the gun was one of the crew. Flying over the submarine, a bomb was dropped by the seaplane, and a hit was made on the tail of the vessel. Turning to repeat the attack, our airmen saw that the explosion had made a large rent in the deck, and this was photographed. At this moment gun flashes were seen some distance in front of the submarine, and through the mist came three more enemy submarines heading for the attacked vessel, escorted by three destroyers. All six vessels opened fire on our machine, but none of their shells was effective. Our seaplane again passed over the U-boat which was sinking by the stern, with the bow fully out of the water. A second bomb was released and exploded about 15 feet ahead of the bow of the submarine, causing her to sink immediately, leaving a quantity of blackish oil, air bubbles, and foreign matter on the surface. Our seaplane, having no further bombs, sent a wireless message explaining the position of the destroyers, and returned home in safety.

Two large seaplanes sighted an enemy submarine travelling about 14 knots. The first machine to reach her dropped a bomb, which exploded, and the submarine began to sink stern first, the bow rising high in the water. The second machine dropped a bomb which exploded immediately in front of the conning-tower. Another explosion occurred under water, followed by several smaller explosions. Two men were on the conning-tower as the vessel sank, but nothing more was seen of them.

Turned Turtle

Again, a seaplane and two aeroplanes on patrol saw a U-boat of very large type, with two periscopes. The submarine dived on hearing the aircraft's engines, but not before the seaplane had dropped two bombs, which fell just abaft the conning-tower, one seeming to be a direct hit. The

submarine turned upside down, and a large bubble, with wreckage, and large quantities of oil, subsequently appeared.

A patrolling airship noticed an attack by a submarine on a steamer, and flew down to the spot. By this time the submarine had submerged. Two bombs were dropped from the airship on the submerged vessel, and several bubbles, one of huge size, came to the surface. Two trawlers dropped depth charges, three of which exploded right over the target, and much oil came up.

A seaplane met a merchant ship and saw a large disturbance on the water 200 yards from the vessel. Then the wake of the torpedo was seen, but the torpedo missed the ship by a few yards. The seaplane, in less than a minute after sighting the U-boat's movements, dropped two bombs, which exploded within eight yards of each other. Large quantities of oil and bubbles rose to the surface; the merchantman proceeded on her course in safety.

An enemy submarine was sighted by two large seaplanes while on patrol. A bomb dropped by one of the seaplanes exploded just abaft the center of the submarine, which listed heavily to port, and went down by the stern within a minute.—*London Times,* 8/4.

BALTIC

GERMAN WARSHIPS ASSEMBLE AT KIEL.—The entire German Baltic fleet, except a few light cruisers, was recalled last week to Kiel, where important naval forces now are being concentrated, says a dispatch from Hamburg received in Geneva and transmitted by the correspondent of the *Daily Express.*—*N. Y. Herald,* 17/5.

BALTIC FLEET SAILS.—Petrograd, April 6.—The Russian warships have left Helsingfors for Kronstadt.

The Soviet Government has decided that the German landing concerns Finland only, and that the Soviet cannot interfere.

The newspapers state that the British Consul at Helsingfors has left for Petrograd.—*Reuter.*

Vasa, April 6.—It is announced that the "Red Guards" at Tammerfors have capitulated.—*Reuter.*

BRITISH SUBMARINES BLOWN UP BY CREWS AT HELSINGFORS.—All British submarines in the harbor of Helsingfors were destroyed when the German naval forces approached the city because it was impossible to get them away, owing to the fact that they were frozen fast, according to an Admiralty statement this evening. The submarines, which have been operating in the Baltic since the early part of the war, were blown up, together with their stocks of torpedoes, ammunition and other materials. Their crews have arrived in England, having traveled by way of Mourmansk.

The seven British submarines were destroyed during the five days from April 3 to April 8. The Admiralty says the project of blocking the harbor by sinking ships in it had been rejected by the Russian admiral commanding in chief.

The effect of the destruction of the British submarines upon the crews of merchant vessels was, however, the statement says, excellent and induced the destruction of many ships which would have fallen into the hands of the enemy.

"The guns at and near Hango," the Admiralty announcement says, "had already been dismantled, and upon the appearance of the German forces the Russians retreated from the vicinity after blowing up their four American submarines.

"Four British submarines of class E were taken outside the harbor of Helsingfors on April 3 and blown up and sunk. Three C-boats were demolished between that day and April 8. Their crews were removed to Petrograd.—*Evening Star,* 17/5.

RUSSIA'S FLEET IN THE BALTIC.—Within easy reach of the Hun lies the naval strength of Russia, a considerable force in ships of excellent design and modern construction which have been rendered completely defenceless by the demoralization of the personnel of the Russian Navy. The Germans have but to advance with land and naval forces from Reval and Helsingfors to Kronstadt and Petrograd to add to their navy four modern dreadnoughts, completed by the Russians since the outbreak of war, 30 modern destroyers of 34 knots speed and 10 modern submarines which were built in the United States and delivered to Russia since the outbreak of war. This is only the cream of the Russian naval strength, however, for Russia has in the Baltic something more than 100 destroyers of which, besides the 30 mentioned above, 20 are but about six years old; probably 15 submarines of 600 tons each in addition to her American built boats, and a number of cruisers, transports and smaller vessels of substantial value as a raiding force to an enemy who can gamble with them recklessly as can Germany.

Only the Ice Has Kept the Hun Away.—As late as the middle of April—the time of writing this article—press despatches told of the continued advance of German land forces on Russian soil. The Germans have not, however, advanced upon Petrograd nor have they attempted to steal the Russian warships and naval supplies at Kronstadt and Pootilof. Little has been said of the likelihood of their doing so. Yet it appears that the only thing that has held off the Hun from this theft is the ice that prevents the advance of his naval forces to Kronstadt. Certainly the Bolsheviki are powerless to prevent the theft. The one hope that remains to save these ships from the Hun is their destruction by Russians who are still determined not to give in to the enemy. The strong land fortifications that formerly barred the way to Kronstadt are now all in German hands and when the ice breaks the Germans have but to push forward to Kronstadt to take their spoil.

Will Their Crews Surrender Them?—It is possible that there are still Russians in the crews on board those warships who will blow up their ships rather than see them fall into the hands of the enemy. But this is only a possibility. If German propaganda has been as effective in Kronstadt as it has elsewhere in Russia it is probable, to say the least, that Germany will obtain possession of the Russian Baltic naval forces without difficulty.

Naval officers who were with the Baltic fleet as late as last November state that the four new Russian dreadnoughts are in good shape. They are new vessels and, although they have not been kept in repair, they have had practically no work and the Germans could easily and quickly put them in shape for action. The dreadnoughts are of 23,500 tons, mounting twelve 12-inch guns. They were laid down in 1909 as the first step toward the rehabilitation of the Russian Navy after the Russo-Japanese War and their guns were placed on board late in 1914.

While a gain of four dreadnoughts by Germany would not shift the preponderance of naval power in capital ships in favor of Germany against Great Britain, it must be borne in mind that the Germans are now staking everything on offensive operations and may reasonably be expected to risk a major naval engagement with the British fleet in a far more determined and genuine attack than they made at Jutland. Thus every capital ship added to the German forces must be considered as reducing the chances—for victory is never a certainty—of the British fleet to win. None of the belligerents have made public any information with regard to increases in naval strength since the outbreak of war. It is impossible, therefore, to state positively what is the German or British strength in capital ships. There have been many tales circulated of fabulous increases in German naval strength but, obviously, Germany has been devoting her resources largely to the construction of submarines. Likewise, Great Britain has been burdened with the construction of

merchant tonnage and with smaller types of warships to be used against German raiders. It is generally considered safe to presume that both Great Britain and Germany have completed, by now, all the dreadnoughts that were building at the outbreak of the war.

Making allowance for the British losses of two dreadnoughts, three battle cruisers and ten pre-dreadnoughts, and for the German losses of one battle cruiser and one pre-dreadnought, the British superiority in capital ship strength, on that basis, would now be about 16 dreadnoughts, three pre-dreadnoughts and one battle cruiser.

Thus the Russian Baltic strength, in dreadnoughts, represents about 25 per cent of the British superiority in that type of ship, and to have even a very safe margin reduced 25 per cent is a development of which serious notice must be taken.

But a possibly more serious development than that is the German gain in raiding strength—in destroyers and submarines. The Russian destroyer strength was always over-developed. It was far greater than our own destroyer strength at the outbreak of the war. The Germans are both under the necessity of employing raiding tactics and are in an excellent strategic position to do so, as we might as well frankly admit. To add a force of 30 modern 34-knot destroyers to the German Navy, plus the secondary Russian force of 20 six-year-old destroyers and 50 vessels of that type of older construction, gives the Germans an increased raiding strength which is indeed a serious matter for our allies and for ourselves. It is a force which the Germans can spend in any reckless venture to wear down the British naval strength and they may be counted upon to gamble with it if they are determined to seek a final issue on the seas.

Not only does Germany gain the Baltic submarine fleet, if she takes Kronstadt, but she obtains as well shipyards in which are facilities for the construction of 12 submarines. The Russians laid down 12 submarines every two years in the Baltic, but that was only the Russian peace time rate of construction and the Germans, with men and materials available, could of course turn them out with much greater speed. Fortunately, Russian raw materials would not be available for the Germans. Most of the raw materials for ship construction in Russia would have to be obtained from the territory that is controlled by General Kaledines and the Cossacks. The Germans could, however, ship raw materials by water from German Baltic ports to Petrograd. It is difficult to determine just what Germany would gain in the way of shipyard and ordnance construction facilities. It is said by Russian officers that there are large supplies of ammunition in stock which the Germans could take over. Shells for the dreadnoughts were provided, they say, which were never used. At Pootilof there is a naval gun factory which would fall into German hands at once.

Clearly this is a chance for gain in naval strength which it would be worth while for Germany to play for and to fight for. But she will not have to fight to get it. It is like a ripe fruit ready to drop into her lap. We have made much of the contribution our navy has made to the allied naval strength in the war zone. Unquestionably the work of the American ships has been excellent. Especially in destroyers—in the character of our ships and in the efficiency of their crews—the contribution of the American Navy to the allied forces is something of which every American can be proud. But we are concerned here only with the matter of the total strength in ships, and the fact is that the Russian naval strength which lies within such easy reach of the Hun is greater than the total strength of the 150 American warships of all types which the Secretary of the Navy has recently informed us are now with the allied forces on the other side.

Clearly the one inference allowed us is that the United States must increase its naval strength in the war zone to overcome any increase in

strength which Germany may score by taking over the Russian fleet. If there was a necessity, in the first instance, for sending these American warships into the war zone in order to increase allied strength, there is now an equal necessity to send enough more American vessels to keep the margin of superiority in naval strength where it is after the Germans take over the Russian ships.—*Sea Power*, May.

MEDITERRANEAN

A German submarine bombarded Kastelorizo, Island of Rhodes, off the coast of Asia Minor.—*Army and Navy Gazette*, 20/4.

DROVE OFF ENEMY U-BOAT.—Secretary Daniels has commended Elmer Dinnes Arnold, seaman, second class, United States Navy, armed guard detail, navy yard, New York, for the efficiency of the gun crew under his command on board the steamship *Chincha* when that vessel was attacked by a German submarine. This was the second time the *Chincha* had been attacked by a German submarine. After Arnold's gun crew had fired eight shots the submarine submerged.

Arnold enlisted at Indianapolis, Ind., September 8, 1915. Next of kin, Lillian Evans, sister, Carmel, Ind.—*Official Bulletin*, 13/5.

TEN DIE WHEN TORPEDO HITS FRENCH STEAMER.—Paris, May 17.—Ten passengers, one European and nine Arabs, were killed when the French steamer *Atlantique* was torpedoed in the Mediterranean early this month. The steamship managed to reach a port by her own means, it is announced. She measures 6447 tons.—*Evening Star*, 17/5.

BRIDGE OVER SUEZ IS NOW COMPLETED.—Cairo, Egypt, Thursday.—The swinging bridge over the Suez Canal at El Kantara, about 35 miles south of Port Said, has been completed. The bridge affords direct railway communication between Cairo and cities in Palestine.—*N. Y. Herald*, 17/5.

ADRIATIC

ALLIED POWER IN THE ADRIATIC.—"In the face of the preponderance in heavy ships which the Allies have at their disposal in or near the Adriatic," says the London *Engineer* in an article in its issue of March 22 on the Italian battle fleet, "it was scarcely to be expected that the Austro-Hungarian fleet would choose to accept a pitched battle. Instead, their tactics have been confined almost entirely to raids by light forces against the unprotected Italian coast and the Allies' lines of communication in the Lower Adriatic. Against such tactics heavy armored ships are of no avail. The vessels of the greatest value in these circumstances are light cruisers and destroyers, and unfortunately the Italian Navy was inadequately supplied with vessels of both types. A number of modern destroyers and old torpedo gunboats have been fitted up as mine-layers, a branch of naval work in which the Italians have proved themselves remarkably efficient. The submarine flotilla includes about 30 boats, coastal and sea-going, the majority of which are of the well-known *Fiat-Laurenti* type, which has been adopted in many foreign navies. Britsh and French officers who have served in the Adriatic theater have returned with the most favorable impressions of the quality of Italian naval material. The design of every ship is obviously the result of a careful study of contemporary principles in strategy and tactics, and betrays a certain independence of view not commonly met with in foreign naval circles."—*Army and Navy Journal*, 30/4.

BRITISH WON SEA FIGHT IN ADRIATIC WITH SLIGHT LOSS.—In the engagement of allied and Austrian light sea forces in the Adriatic on

April 22 the British lost seven men killed and 19 wounded, the Admiralty reports. Two British destroyers, which for a time fought five Austrian destroyers, were damaged only slightly. (The official Austrian account of the engagement issued yesterday, said one British destroyer was damaged seriously.) The announcement follows:

"On April 22 five Austrian destroyers were encountered and engaged by two of our destroyers in the Adriatic. The enemy fled for shelter to the fortified port of Durazzo, pursued by our destroyers, which had been reinforced by five more British and one French destroyer. The chase continued until after midnight when touch with the enemy was lost.

"Our two destroyers, which engaged this very superior enemy force, received only minor damages. Our total casualties were seven killed and 19 wounded. It is not known what damage was sustained by the enemy.

"On the following day Durazzo was attacked by British air forces. The only man-of-war in the harbor was one gunboat. Our machines attacked the seaplane base, dropping nearly a ton of bombs, with apparently successful results. All our machines returned safely to their base."—*N. Y. Herald*, 28/4.

ITALIANS TORPEDO AUSTRIAN WARSHIP IN RAID ON POLA.—An Austrian battleship was torpedoed by Italian naval forces in Pola Harbor early Tuesday morning, it was officially announced to-day. The battleship was of the *Viribus Unitis* type.

The Italian force worked its way into the Austrian naval base by dodging the patrol boats and searchlights of the defenders.

While the naval operation was progressing an Italian seaplane force engaged Austrian battleplanes above Pola. Two of the Austrians were brought down and several others were compelled to descend out of control. The Italian machines all returned safely.

The text of the official announcement reads:

"Italian naval units, avoiding patrol boats and searchlights, succeeded in entering Pola Harbor early on Tuesday and in torpedoing an Austrian battleship of the *Viribus Unitis* type.

"Simultaneously Italian seaplane squadrons attacked Austrian battleplanes over Pola, brought down two and forced several others down out of control. The Italian machines all returned safely to their bases."

[There are four Austrian battleships of the *Viribus Unitis* class, which comprised the largest and most modern fighting vessels completed for the Austrian Navy up to the time the European war began. The other ships of the class are the *Tegetthof*, the *Prinz Eugen* and the *Szent Istvan*. The nameship was completed in October, 1912, and the others at intervals between then and the beginning of the war, with the exception of the *Szent Istvan*, which was not finished until 1915. Each battleship of the class displaces 20,000 tons, is 525 feet long over all, 89 feet beam and 28 feet draught. Their armament comprises twelve 12-inch and twelve 5.9-inch guns in the main battery, with eighteen 11-pounders and various smaller guns, and from two to six torpedo tubes. The complement of the battleships ranges from 962 to 988 men. All are heavily armored and are classed as dreadnoughts. The *Viribus Unitis* developed a speed of 20.9 knots on her trial trip.]—*N. Y. Herald*, 17/5.

ITALIAN WARSHIPS IN RAID AT DURAZZO SINK TWO VESSELS.—*Enemy Torpedo-Boat and Steamer Sent Down.—Airplanes Bomb Military Works.* —Rome, May 17.—Italian naval forces torpedoed and sank an enemy torpedo-boat and steamer at Durazzo, on the eastern coast of the Adriatic Sunday night, it was officially announced to-day.

Italian airplanes bombed and set fire to military works in Lisza and Durazzo Tuesday.

Lisza is on the island of that name north of Durazzo.—*Baltimore Evening Sun*, 17/5.

BLACK SEA

RUSSIA'S BLACK SEA FLEET.—The latest direct information available comes from naval officers who were with the Russian fleet in the Black Sea in October, 1917. At that time there were two dreadnoughts in the Black Sea fleet. These ships were completed since the outbreak of war and are in every way first-class ships and of excellent design. Three of them were built but one, the *Imperatriza Maria*, was sunk. The *Alexandra III* and the *Ekaterina II* which remain are ships of 22,500 tons, each mounting ten 12-inch guns. More attention should be paid to the older battleships and cruisers in the Black Sea fleet than we gave that type of vessel in the Baltic fleet because the ships of enemy navies against which the Black Sea fleet, in German hands, and the Turkish fleet would be matched would have more vessels of older types. The Black Sea fleet includes the *Ievstafi*, *Pantelimon* and *Ioam Zlatoust*, ships completed in 1906, of 12,800 tons and each with armament of four 12-inch guns and four 8-inch. There is also an old type battleship of 9000 tons, built in 1896, carrying four 10-inch guns and the *Tri Sviatitelia*, built in 1893 and carrying four 12-inch guns. Two protected cruisers, the *Kagoul* and the *Pamiat Merkooria*, are of 1903 vintage and carry twelve 6-inch guns. They are both 6700-ton vessels. Although the lists of 1914 give only nine new destroyers to the Black Sea fleet, I am informed that there are 14 such vessels at Sebastopol, all 33-knot ships. There are also four 600-ton, nine 350-ton and four 250-ton destroyers, all of about 25 knots speed. Nine new submarines were built for the Black Sea fleet since the outbreak of war and there are 13 old submarines, about 10 years old.

Turkey's Contribution.—If the Germans obtain possession of the Black Sea fleet they would, of course, combine it with the Turkish fleet and with the *Goeben* and the *Breslau*, the German cruisers now in Turkish waters. The *Goeben* was beached and injured. She was reported destroyed by the British but the Germans claimed to have floated her again and to have made her ready for action. She is a battle cruiser of 23,000 tons carrying 10 modern 50-caliber 11-inch guns, and of high speed.

To this fleet Turkey could contribute two dreadnoughts built in 1913, the *Sultan Osman I* and the *Sultan Mehmet Rechad V*, the former a 23,000-ton vessel with ten 13.5-inch guns and the latter a 27,500-ton ship carrying fourteen 12-inch guns. The Turks have two old battleships built in 1891 and a protected cruiser built in 1903 as well as a miscellaneous assortment of old cruisers and gunboats, not worth much. They have very little to offer in the way of destroyers.

But the total would make a considerable naval strength with five excellent capital ships as the backbone of the fleet. The Italian and French naval forces in the Mediterranean must keep the Austrians bottled up. The existence of such a German naval force in the Levant would threaten Greece, if it did no more, and would cost the Allies a considerable naval strength to guard against this danger. It is the necessity that the Allies face to protect so many miles of coast in such widely separated zone that makes their naval problem difficult. The Germans can concentrate and select the moment when they wish to strike, remaining safely protected by land fortifications meanwhile. But the Allies must be ever on the alert, watching two exits in the North Sea to guard against the approach of the German High Seas fleet; keeping the Austrian naval forces bottled within the Adriatic, the Turko-German forces within the Dardanelles and battling with the submarine all the time. Thus the creation of any hostile naval force that constitutes a continuing menace makes their problem more difficult and requires them to employ sufficient strength in ships and men to negative that force. If the enemy's strength in the Levant is increased, a further strain is placed upon allied forces in the Mediterranean and in turn upon their forces in the North Sea.

The American Navy is the only untouched reserve from which they can draw new strength to meet such a menace.

It would be more difficult—much more difficult—for the Germans to gain possession of the Russian Black Sea fleet. That fleet is now at Sevastopol and the Germans have no naval force with which to take it. Moreover, the morale of the Russians in the Black Sea fleet is somewhat better than in the Baltic and it is believed there would be a defence of that fleet. But it is a possibility—and I do not say that it is not a probability—that the Germans will capture the Black Sea fleet likewise. And so long as it is a probability or a possibility, we should now—not when it happens—take any necessary steps to guard against danger.—*Sea Power*, May.

BLACK SEA FLEET IN PERIL, RUSSIANS HEAR.—Mr. Tchitcherin, Bolshevik Foreign Minister, has asked Germany, according to the official news agency, to give a guarantee that the Russian Black Sea fleet, while remaining at Sebastopol, will not be seized or damaged by forces of the Central Powers and their allies now advancing into the Crimea, nor by any other naval or military forces of that alliance.

The Foreign Minister has taken this action, it is added, as he has heard that the Germans intend to blockade Sebastopol with submarines.—*N. Y. Herald*, 26/4.

PACIFIC

FIFTY-EIGHT IN "SEEADLER" CREW INTERNED IN CHILE.—Fifty-eight of the crew of the German raider *Seeadler*, which operated in the South Pacific Ocean until it was wrecked, have been interned in Chile, according to an announcement to-day by naval authorities here.

The *Seeadler* sank a number of American vessels and was wrecked on an island in the Pacific. The crew was transferred to a captured vessel and continued their raids on commerce until they were captured.—*N. Y. Herald*, 20/4.

INTERNED SHIP BURNED.—*Prinz Eitel Friedrich Sinks at Anchor in Colombian Harbor.*—The German steamer *Prinz Eitel Friedrich*, which has been interned at Puerto Colombia, was burned and sunk at her anchorage there to-day.

The steamer was owned by the Hamburg-American Line and displaced 4650 tons.—*Baltimore Sun*, 28/4.

U-BOATS

TEN SUBMARINES SUNK BY AVIATORS.—Details concerning the destruction recently of ten German submarines by naval aircraft, eight by seaplanes and the others by dirigibles, have been obtained by the Associated Press from British Admiralty reports. The first case is described as follows:

"While on patrol in the English Channel a seaplane sighted a submarine eight miles away, directly in the path of an oncoming convoy of merchant ships. The seaplane dived at 90 miles an hour. The submarine attempted to escape by submerging, but was just awash as the seaplane reached a bombing position and released two bombs, one of which exploded on the conning-tower. The seaplane dropped two more bombs into the midst of the air bubbles from the collapsed submarine, which was of the largest type, carrying two guns."

The second case: "At dawn a seaplane sighted a large submarine on the surface, with a member of the crew standing by the gun. The seaplane dropped a bomb on the tail of the U-boat and afterward photographed the

sinking submarine, with a big hole in its deck. A second bomb was dropped close to the submarine's bow and the U-boat collapsed."

The third case: "Two seaplanes attacked a large submarine traveling on the surface at 14 knots, with two men in the conning-tower. A bomb was exploded close to the conning-tower, and the submarine began to sink stern first. A bomb from a second seaplane completed the work."

The fourth case: "Three patrol planes sighted a large submarine as it was submerging and dropped two bombs close to the conning-tower, causing the submarine to turn turtle and disappear in a mass of oil and wreckage."

The fifth case: "A seaplane sighted two submarines close to the surface and dropped two bombs. One bomb was ineffective, but the other hit the deck fairly amidships. The submarine was hidden by the smoke of the explosion, and when the smoke cleared the U-boat was sinking, with both ends in the air."

The sixth case: "A seaplane saw the track of a torpedo fired at a merchantman. It dived toward the shadow of the submarine, well below the surface. It dropped two bombs, which both exploded close to the submarine, resulting in a large quantity of oil, bubbles and wreckage."

The seventh case: "Two seaplanes sighted a U-boat on the surface and dropped a bomb each. The first bomb caused a heavy list to the U-boat, which began to sink by the stern. The second bomb exploded in the center of the swirl, demolishing the U-boat."

The eighth case: "A seaplane dropped a bomb on a submarine just emerging, and the U-boat disappeared with a heavy list to port. The pilot dropped a second bomb into the swirl, and a few minutes later a patch of oil 150 feet long and 12 feet wide appeared on the surface."

The ninth case: "A naval airship at midday sighted a suspicious patch of oil and circled it in an effort to ascertain the cause. Suddenly a periscope broke the surface in the midst of the oil. The airship dropped a bomb close to the periscope, and a series of bubbles began appearing, indicating that the damaged submarine was moving slowly away under the water. Several more bombs were dropped in the path indicated, until satisfactory evidence was obtained of the enemy's destruction."

The tenth case: "An airship dropped two bombs over a submarine which was engaged in attacking merchantmen. Great patches of oil and bubbles indicated severe damage, and trawlers made this complete by depth discharges."—*Flying*, May.

TORPEDOED U-BOATS.—Permission has been given by the British Admiralty to publish from its records the following details of further typical encounters with U-boats:

Motor launches were out on patrol when one of them detected a submarine under water. This was confirmed shortly afterwards by the two other boats, and appearances indicated that the submarine was zig-zagging. The hunters took up the chase, and it became obvious that the submarine realized she was being pursued and was stopping every time the launches stopped. So the game of blind man's buff went on till at last the launches had maneuvered into the desired position. Then they "laid their eggs." There were some under-water explosions, and a quantity of oil spread itself over the surface of the sea.

A submarine has been reported in a particular area, and it was pretty certain that she was lying on the bottom. The German would have to come to the surface to charge batteries, but as this proceeding would be highly dangerous for him in daylight, it was much more likely that he would attempt the operation by night. Accordingly a number of vessels were detailed to watch for him during the night in question. Luck was with the flotilla; the sea was very smooth, the night dark but clear, and the vessels engaged took up their appointed stations for the hunt. Between 1 and 2 a. m., one of the vessels "got a clue," and at once proceeded to the spot so as to be ready to welcome the U-boat directly he came to the sur-

face. Presently the German was sighted and fire was opened on him. He hastened to submerge, helped by a depth charge, after which nothing was heard of him.

A destroyer was escorting a convoy of merchantmen when she sighted the periscope of a submarine before the beam of the convoy and about half a mile away. The destroyer made haste to close, while the enemy quickly dived. A depth charge was dropped into the swirl caused by the German's disappearance, and the under-water explosion drove wreckage and portions of the submarine up to the surface. Just then another periscope was sighted, and a round was fired in its direction. This submarine fired a torpedo at the destroyer, but missed her and then submerged. Another destroyer engaged in escort duty sighted a periscope about two miles distant, and headed for the position. A depth charge was dropped in what was guessed to be the enemy's course, the German having dived, but with no apparent result. The destroyer continued her work, and at the end of an hour there came a dull and heavy under-water explosion. Then quantities of oil rose to the surface; but nothing more of the submarine was seen.

In the following terms the captain of one of our submarines described in his report how he sank an enemy vessel:

10 a. m.—Sighted hostile submarine; attacked same.

10.03 a. m.—Torpedoed submarine, hit with one torpedo amidships. Submarine seen to blow up and disappear. Surface to look for survivors. Put down immediately by destroyers, who fired at me.

By way of a note he adds: "During my attack there was just enough sea to make depth-keeping difficult. I fired two torpedoes, and one hit at forward end of conning-tower. A large column of yellow smoke, about one and a half times as high as the mast, was observed, and the submarine disappeared. The explosion was heard and felt in our own submarine. I proceeded four miles northward, and lay on the bottom. Many vessels throughout the day were heard in proximity. Several explosions were heard, especially one very heavy one. It must have been close, as the noise was considerably louder than that of the torpedo. On one occasion a wire-sweep scraped the whole length of the boat along my port side, and a vessel was heard to pass directly overhead."

After a chase lasting nearly two hours one of our submarines succeeded in sinking her quarry, an enemy submarine. The hostile vessel had evidently just come to the surface, as men were noticed on her bridge spreading the bridge screen. While maneuvering to attack, our submarine had to pass through shallow water, and as the sea was rough at the time, she frequently bumped the bottom heavily, but, fortunately, avoided breaking surface.

At a range of 550 yards both bow tubes were fired. On firing the periscope was dipped in case the boat rose, and the tube was brought to bear so as to be ready in the event of a miss with both tubes. Fifteen or twenty seconds after firing a dull report was heard.

On the periscope being raised, after a short interval, nothing was seen of the enemy submarine, but there was a great disturbance in the water where she had been. On proceeding to the spot where she was last seen, it was observed that the water was covered with an oily substance, which stuck to the glass of the periscope, obscuring vision. Although the vessel was not actually seen to sink there is little doubt that she was torpedoed, as it is improbable that she could have dived while steaming on the surface in the brief space during which the British submarine's periscope was lowered.—*Army and Navy Register*, 27/4.

JUST WHAT THE U-BOATS ARE DOING.—The failure of the German submarine to prevent the landing of American forces in France and food for the Allies is given by some observers as the real cause of the Hindenburg drive on the western front. It is generally conceded, remarks a writer

in the New York *Sun*, that the German Government timed the drive in the hope of getting a decision before the United States was able to throw its weight into the military scales on the side of the Entente. This is an admission that the U-boat campaign can no longer be relied upon to stop the flow of troops, provisions, and supplies from this country to Europe. As a further indication of the diminishing efficacy of the submarine, we have the low record of sinkings in the week ending April 7, when the U-boats' toll was four large and two small vessels. To say that the submarine menace has been brought fully under control would be foolish, remarks the Atlanta *Journal*, which thinks it will probably remain more or less of a menace to the end of the war. However, there is assurance in the fact that the stroke on which the Huns counted a year ago to win has been "broken to such an extent that they themselves now recognize how indecisive it is." A corroborating German opinion is found in the Berlin *Lokal Anzeiger*, whose navy expert, Captain Kühlwetter puts this question: "How is it that despite our submarines' work we hardly ever sink an American troop-transport, or when we do sink one we always find that only the ship is lost, whereas the troops whom we really want to destroy are always saved?" To his own question, Captain Kühlwetter gives this reply:

"American transports travel in convoys, well protected against attack, and are very fast. Thus the submarines have a most difficult and dangerous task. This is particularly true in the Channel, where the enemy can choose the most favorable hours of the day and can protect himself by all sorts of devices, mines, nets, etc.

"To try to seize the bull by the horns here would mean attacking a powerful enemy front, which can be broken more cheaply in other ways.

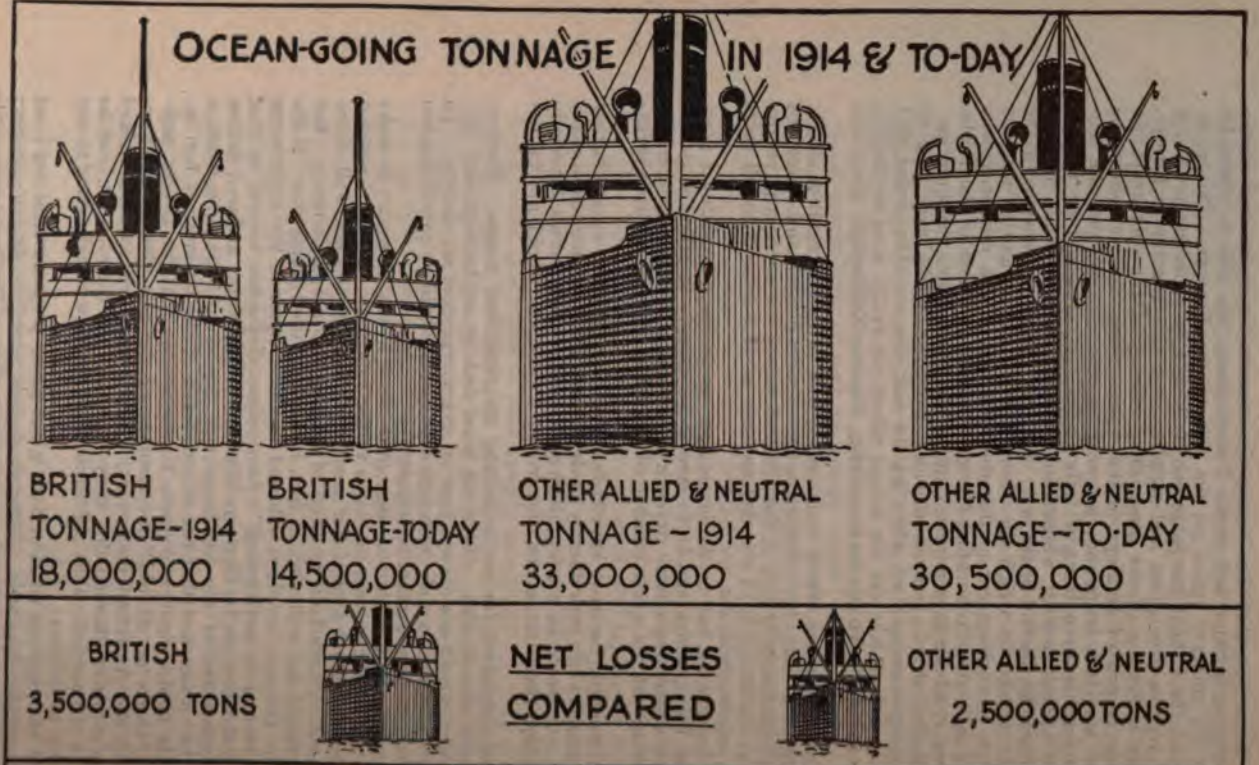
"In other waters the enemy defence is not quite so easy, but there he takes advantage of the great number of available harbors of disembarkation.

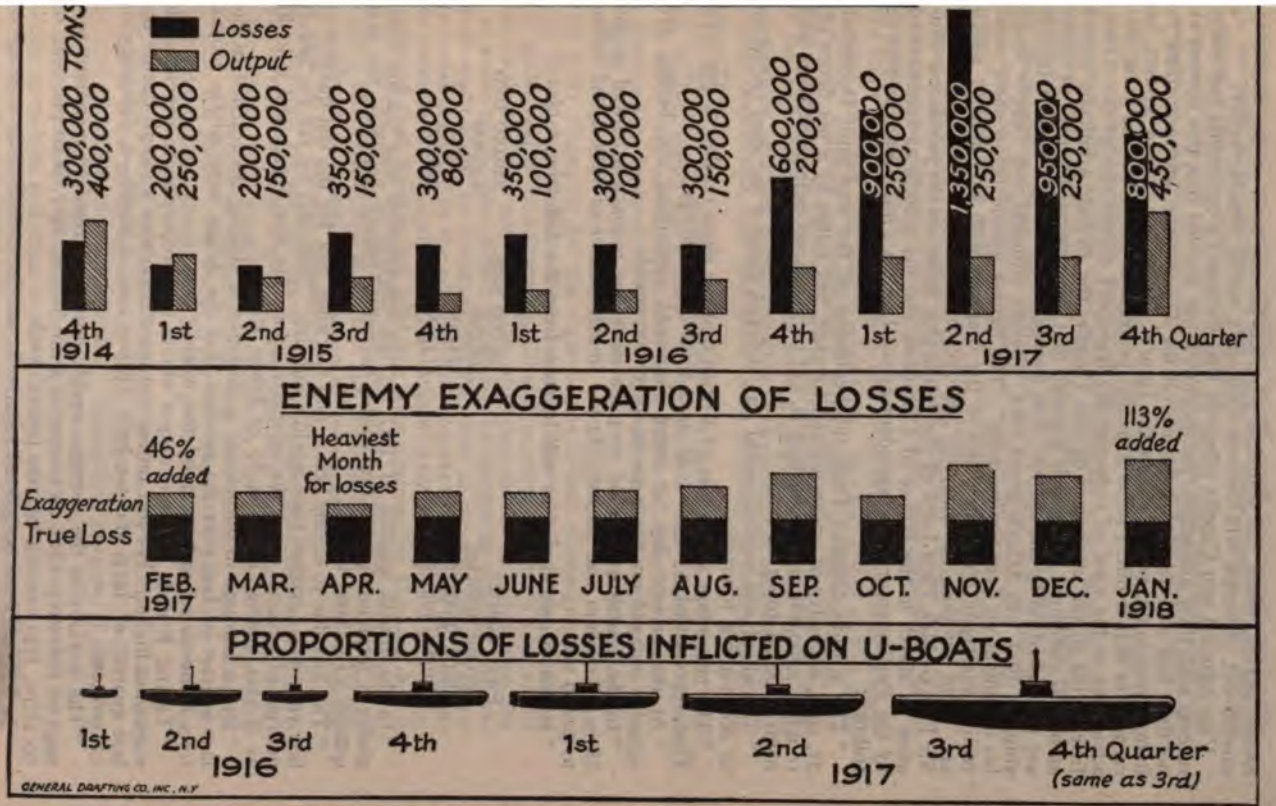
"It is not possible for us to have U-boats waiting off every enemy harbor until the transport can conveniently be destroyed. We have not got so many submarines. It would be wasting them and their precious crews, especially as if the ships were torpedoed the troops themselves would not be destroyed. . . .

"It is not important for us to destroy the American troops. Hindenburg will take care of that. What we must destroy are tonnage and cargoes. Besides, we do not always hear of every transport we destroy. To make it our only aim to sink American transports would be sacrificing too many U-boats without perceptible results."

Vice Admiral von Capelle, too, seemed to think it was necessary to make an explanation of the submarine status to the Reichstag, and the Brooklyn *Citizen* sagely observes that if the great drive had turned out well, there would, of course, have been no need of making such an explanation. But it has not turned out well, and, in fact, is so much the reverse that "if the mind of the German people is allowed to dwell upon it, the very worst consequences may be anticipated." Amsterdam dispatches inform us that Vice Admiral von Capelle, German Minister of the Navy, declared before the main committee of the Reichstag that the new U-boat construction exceeded the losses and that the effectiveness of the submarines had increased. He quoted figures to prove his contention that the U-boat sinkings were "thrice or sixfold" the tonnage of the new British construction. As to the American destroyers, "which had been so much talked about," the minister claimed that they had failed in their object, and he is quoted by the semiofficial Wolff Bureau of Berlin with reference to our ship-building as follows:

"For the carrying out of America's giant paper program America must first lay down the shipyards. After prodigious promises America in 1917 built 750,000 gross register tons of sea-going ships. The large mercantile fleet placed on order America does not want for the war, but the *post-*


OCEAN-GOING TONNAGE IN 1914 & TO-DAY
BRITISH TONNAGE-1914 18,000,000
BRITISH TONNAGE-TO-DAY 14,500,000
OTHER ALLIED & NEUTRAL TONNAGE – 1914 33,000,000
OTHER ALLIED & NEUTRAL TONNAGE – TO-DAY 30,500,000
BRITISH 3,500,000 TONS
NET LOSSES COMPARED
OTHER ALLIED & NEUTRAL 2,500,000 TONS
PRESENT OUTPUT (BRITISH)
Monthly output necessary for safety, 150,000 TONS
JANUARY, 58,000 TONS



THE WAR WITH THE U-BOATS; BRITISH ADMIRALTY FIGURES OF LOSSES AND GAINS.

bellum period, when, the shipping program having been in the meantime carried out, America will become England's world freight-carrier."

Vice Admiral von Capelle admitted that Germany's opponents had some success with their antisubmarine measures, but averred that this success at no time had any decisive influence on the U-boat war, and according to human reckoning, would not in the future. As to our convoy system, he recognizes that it offers ships a certain protection, but it has the great disadvantage in his view of reducing the transport capabilities of the Allies. In replying to the utterances of von Capelle, the British Admiralty issued an official statement in which it is stated that "exaggerated figures of losses are still relied on by the enemy. The average of monthly losses of British ships in 1917 was 333,000 gross tons, whereas Admiral von Capelle bases his argument on over 600,000 tons." The figures quoted below show some trifling discrepancies from those in the diagram with this article; which are from another summary of the report of the British Admiralty. Sir Eric Geddes, First Lord of the Admiralty, spoke on the submarine situation in March in the House of Commons, and his speech, as summarized by the Parliamentary correspondent of the London *Times*, reads in part as follows:

"The world's tonnage from the beginning of the war until December 31, 1917, exclusive of enemy-owned tonnage, has fallen by a net figure of, roughly, 2,500,000 gross tons, that is, out of 33,000,000 estimated Allied and neutral ocean-going tonnage.

"The allied and neutral world has suffered about 8 per cent reduction in ocean-going tonnage.

"The percentage of net loss of British tonnage alone reaches 20 per cent. That represented 3,500,000 tons on a total of 18,000,000.

"At the present day, 47 large shipyards, containing 209 berths, are actually engaged on ocean-going merchant vessels.

"In the fourth quarter of 1914 the merchant tonnage produced in the United Kingdom was 420,000. In the fourth quarter of 1915 it had fallen to 92,000 tons.

"It then began to rise, as will be seen from the following table:

	1916	1917
First quarter	95,000 tons	246,000 tons
Second quarter	108,000 "	249,000 "
Third quarter	125,000 "	248,000 "
Fourth quarter	213,000 "	420,000 "

"In the fourth quarter of 1917 foreign construction was 512,000 tons, giving a total output for the world, excluding enemy countries, for that quarter of 932,000 tons.

"The loss due to enemy action and maritime risk for the last quarter of last year was 1,200,000 tons world's shipping. That was by far the lowest quarter of sinkings since the intensive submarine war began, and it looks as if this quarter is going to be lower still.

"By an increase in output and a decrease in sinking we reached in the last quarter of last year the position that the Allies were within 100,000 tons a month of making good the world's loss.

"Taking British loss and output alone, the proportionate deficiency is somewhat higher. We lost on an average 260,000 tons a month during the last quarter of 1917, and we built 140,000 tons a month—a deficiency of 120,000 tons.

"The increase in the average weekly output of repaired merchant tonnage in February, 1918, as compared with August, 1917, is 80 per cent, or 69 ships, representing 237,000 tons a week.

"In February we completed repairs to merchant craft at an average of 166 ships a week, representing more than 500,000 tons.

"We docked last year ten times the naval craft for repairs and refits which we dock in peace time. Over 3000 of these vessels were docked and refitted in the last quarter of last year.

"The additional men who have been put on to both merchant and warship repairs could have produced 500,000 tons of new merchant tonnage a year.

"During the last seven months the net addition to labor in private yards has been round about 18,000, mainly unskilled.

"Compared with January, there was in February a net increase on new construction, hulls, and machinery of over 2500, which is as much as the merchant yards can digest in the time with the skilled men available."

The Philadelphia *Press* says flatly that von Capelle had to justify his piratical work to the Reichstag committee, and he did it as well as he was able, but "in reporting secretly to the real masters of Germany, the military clique, he probably came nearer to the truth." This journal mentions the British Admiralty report above cited, and says that, thanks to its frankness, the fictitious figures of von Capelle can create no consternation in the anti-German world, for—

"We know that he lies when he says that from three to six times as many allied ships are being sunk as are being built. We know that he lies when he says that America is deliberately withholding the completion of her building program until after the war in pursuance of a mercenary design to wrest the commerce-carrying trade from England. And we suspect that he lies when he says that U-boat building in Germany has exceeded the rate of U-boat destruction, and that there is no difficulty in obtaining willing U-boat crews.

"The worst of the shipping situation was presented to the world last month in the following terms: Somewhat less than 12,000,000 gross tons of allied and neutral ships have been destroyed since the war began. New construction replaced more than 5,000,000 tons. The seizure of German ships added two and a half millions more. Thus the net deficit for the period of the war was calculated as 2,632,297 tons.

With every allowance for the vigor of the U-boat campaign, the *Press* goes on to say, as well as for the constantly improving methods of fighting it, it is probable that the submarine will sink as many ships this year as the British yards can turn out. Thus the American yards are called upon not only to make up the past deficit, but to fill the increasing tonnage requirements brought about by American participation in the war on a progressively larger scale and by the reduced effectiveness of common carriers due to the necessity of maintaining a transatlantic convoy system. The *Press* is convinced that Britain can hold her own against the U-boats, but it remains for America to achieve mastery over them, and "this fact is thoroughly understood at Washington, and the appointment of Mr. Schwab is a significant, if belated, recognition of its importance." The Newark *News* says of the Schwab appointment:

"Mr. Schwab, chosen for his present important post primarily for his success in relations with war-labor, his reputedly fair treatment of workmen, the results so far accomplished by him in a private capacity, bespeaks the sort of sympathetic understanding that will count. 'My place,' he says, 'is in the yards.' He wants every one connected with each yard to feel as he does—that nothing will be any good to any of us unless we win this war.

"Mr. Schwab knows, or should know, as well as any American business man, that it is no policy to rely on overconfidence. It is not to be presumed that he will make that mistake. Stimulation, purposeful direction of ship-building activities—in a word, ships—that is his job. To translate American desires into acts is the high privilege and imperative duty devolving upon him and upon every shipyard associate."

Testimony to the efficiency of the allied effectiveness against the U-boat is found in a dispatch from a French seaport in which Mr. James Kerney,

director for the Franco-American Committee of Public Information, is quoted as saying: "A French vice admiral told me that it was due to the great skill and cooperation of the American Navy that no tonnage has been lost on this coast for three months. He was most enthusiastic in his praise of Rear Admiral Wilson, who seems to have captured all this part of France. The depth bomb, listening device, and hydroaeroplanes in the hands of the Americans have conquered the submarines." Washington dispatches to various dailies disclose confidence among officials that the submarine menace is doomed, and in reply to the boast of Vice Admiral von Capelle that U-boat construction is exceeding losses, a correspondent of the Philadelphia *North American* cites navy officers as predicting that the menace will be wiped out by August, and perhaps by June. The *North American's* correspondent informs us further:

"Despite the vaunting passage in von Capelle's address that speaks of U-boat commanders so well trained that they manage to sink 'from three to four ships in succession belonging to the same convoys,' America has lost since the war began only 14 vessels, aggregating 75,000 tons.

"The outstanding facts in refutation of von Capelle's attempt to cheer the German people are these:

"The total neutral and allied tonnage is now approximately 42,000,000 tons;

"America will add this year at least 3,000,000 tons, possibly more than 4,000,000, according to some estimates;

"Great Britain will add at least 1,800,000 tons more, according to von Capelle's own admission;

"The total of other construction on the basis of 512,000 tons the last quarter of 1917, a conservative basis in view of winter-weather conditions, will amount to at least 2,048,000 tons, most of which will add to allied operations directly or indirectly.

"Japan already has agreed to build an additional 200,000 tons of shipping this year for America, and probably will build another 200,000.—*Literary Digest*, 4/5.

THE PERISCOPE.—It is a well-known fact that at a height of one foot from the water an object can be seen at 1.32 miles; at six feet elevation the range of vision is increased to 3.23 miles while at ten feet the horizon is increased to 4.16 miles. This in clear weather puts great limitations upon the sight of a submarine periscope, as all allied merchant vessels are keenly on the lookout for such. From the above it is also very evident that aircraft have extraordinary value in scouting for submarines, as at 25 feet elevation an object can be seen 6.59 miles away; at 100 feet, the range of vision is increased to 13.17 miles; at 500 feet, the line where sea and sky meet is 29.45 miles away.

At a mile high an aeroplane has a range of vision of 95.7 miles. At this height, with powerful telescopes, an aircraft can sweep an area of about 300 miles. In order to distinguish the camouflaged vessels of the Allies, the Germans have fitted their latest periscopes with ray filters, which clearly bring out the outlines of such otherwise invisible vessels.—*Marine Engineering and Naval Architect.*

SINKING OF U-BOATS IS STEADILY INCREASING.—London, May 8.—"The sinking of German submarines steadily increases," said Thomas MacNamara, parliamentary secretary to the Admiralty, in a speech at Bristol. He added that the destruction of merchant ships has fallen steadily month by month. The output of tonnage is now well ahead of that in 1917. The demand for immediate ship production on England is now large, however.

Mr. MacNamara declared that the big program made for England and America would take time to mature.—*Baltimore American*, 8/5.

THE PLUS AND MINUS OF U-BOAT WARFARE.—All of us who believe that the psychological war is as important if not more so than the war of arms

will rejoice that the British Admiralty has decided to give, periodically, the full facts as to tonnage sunk and tonnage built among the allied nations. Certainly the first statement of this kind, as made by Sir Eric Geddes, is reassuring. The total of allied and neutral shipping losses, due to enemy action and marine risk in gross tons since the beginning of the war, is 11,827,572 tons. During that time, the Allies and neutrals built 6,606,275 tons of new shipping. Furthermore, there is a total of 2,589,000 tons of enemy vessels, either captured or taken over and brought into service. It follows that the net losses to the Allies and the neutrals up to the 1st of January, 1918, is 2,632,297 tons.—*Scientific American*, 27/4.

A BAD TIME UNTIL AUGUST.—Admiral Lord Jellicoe, in an address at Hull last month on the submarine situation, said that the reason losses by submarines in the Irish Sea were so heavy was because there was shoal water on each side of the sea, at the bottom of which "the submarines could lie for 48 hours at a time." When they "got a craft on to her the submarine would sit at the bottom until the trouble was over." He said that the difficulty of chasing the submarines into their own pōrts was that, for a radius of 150 miles around Heligoland Bight, the water was shoal and the submarines could sit at the bottom. At night a submarine could be seen at a distance of only 200 yards and the shoal area stretched for some 300 miles from Denmark to the Dutch Islands. "I am afraid," Lord Jellicoe said, "we are in for a bad time for a few months . . . . but I have confidence that by about August we really shall be able to say the submarine menace is killed."—*Scientific American*, 27/4.

U-BOAT SINKINGS STILL EXCEED SHIP OUTPUT.—"During the year 1917 German submarines sank more than 10,000,000 dead-weight tons of shipping —11,000,000 would be nearer the truth"—said Bainbridge Colby, member of the United States Shipping Board, before a meeting of the Executive Committee of the Merchants and Manufacturers' Association to-day.

Last month, he said, the sinkings exceeded the combined tonnage built by Great Britain and the United States during that month. More than 11,050 large British steamers have been sunk since the war began.

"The submarines to-day," Mr. Colby continued, "are sinking ships faster than are built at present, and the only way to cope with the under-water assassins is to build ships with such a frenzy that the lanes of the ocean will be choked and the submarine pirates will be beaten. We must have ships. The submarines are still sinking more ships than are being built. Without ships we cannot send men, food or munitions to the other side. It is for our workingmen, our employers to realize that we can, by their enlightened impulse, achieve that unity of purpose which will win for us."

As a result of this expansion of the havoc wrought by the German U-boats the committee unanimously adopted a resolution pledging its fullest support to the government ship-building program.

Holden Evans, President of the Baltimore Dry Dock and Shipbuilding Company, announced that they had laid the keel of a vessel yesterday which he promised would be launched in 50 days.

A White Paper, published March 22, 1918, placed the gross merchant tonnage lost in enemy action in 1917 at 6,623,623 tons, distributed as follows:

Period	British	Foreign	World's total
First quarter	911,840	707,533	1,619,373
Second quarter	1,361,870	875,064	2,236,934
Third quarter	952,938	541,535	1,494,473
Fourth quarter	782,889	489,954	1,272,843
Total	4,009,537	2,614,086	6,623,623

The same White Paper revealed the output to be as follows:

Period	British	Foreign	World's total
First quarter	246,239	282,200	528,439
Second quarter	249,331	377,109	626,440
Third quarter	248,283	368,170	616,453
Fourth quarter	419,621	512,402	932,023
Total	1,163,474	1,539,881	2,703,355

The net loss for the year was shown to be 3,920,268 tons; the net loss since August, 1914, 2,632,297 tons.—*N. Y. Times*, 4/5.

SUBMARINE SINKINGS REMAIN CONSTANT.—Recent Berlin advices are to the effect that 702,000 tons of shipping were destroyed by the submarines of the Central Powers in December, last. For the first 11 months of Germany's intensified submarine warfare, no less than 8,958,000 tons gross were sunk, it is claimed. Attention is called to the fact that the list of sinkings recorded in the last month of 1917 is noteworthy in several respects. The loss inflicted on the world's shipping was 100,000 tons greater than in November, and 30,000 tons more than in September and October. An attempt is also made to estimate the relative percentage of the total tonnage operating in the war zone sunk from month to month. In the following table, it is assumed that one-third of the tonnage available for the three blockaded countries, Great Britain, France, and Italy, is permanently in the war zone.

Month	Tonnage in war zone	Tonnage sunk	Per cent
February	8,217,000	781,500	9.5
March	8,125,000	885,000	10.9
April	7,958,000	1,091,000	13.7
May	7,817,000	869,000	11.1
June	7,667,000	1,016,000	13.5
July	7,508,000	811,000	10.8
August	7,367,000	808,000	10.9
September	7,200,000	672,000	9.2
October	7,058,000	607,000	9.5
November	6,900,000	607,000	8.8
December	6,733,000	702,000	10.4

How the tonnage operating in the war zone is estimated from month to month is not explained. According to the above figures, the tonnage in the war zone dropped from 8,217,000 tons to 6,733,000 tons between February and December last. This is a loss of 1,488,000 tons, or approximately 18 per cent. It would seem from this as though the Germans were willing to concede that in 11 months of ruthless submarine warfare they had only diminished the tonnage available for the Allies by one-fifth.—*Nautical Gazette*, 28/2.

U-BOATS HAVE MURDERED 14,120 NON-COMBATANTS.—There is a danger lest familiarity, even with such a monstrous crime as unrestricted U-boat warfare, should breed indifference to its enormity. Therefore, it is well to bear in mind that, except when the attack is made on fighting ships or transports carrying fighting men, the torpedoing of ships and sending men to their death far out at sea, is simply murder, unredeemed by any extenuating circumstances whatsoever. Just how great a bill of indictment is being drawn up by the German Admiralty against itself is seen in the statement given by the Government Leader in the House of Commons early last month, that up to February 5, 1918, the German U-boats had killed 14,120 non-combatant British men, women and children. This be it noted is exclusive of the murders done upon peoples of other nationalities.—*Scientific American*, 9/5.

U-BOATS SUNK EXCEED THOSE BUILT.—Announcement from Paris that in the last three months more submarines have been sunk than have been built, bears out recent unofficial statements here on the submarine situation. It has been no secret that officials here have felt more encouraged within the last few months than at any time since the unrestricted submarine campaign began.

Merchant ship construction by the United States and the Allies already has passed the real danger point and ships are being launched faster than they are sunk. Officials pointed to this fact to-day as proof of the wisdom of the American policy of building an enormous merchant fleet.

As the supply of submersibles begins to diminish the biggest part of the shipping problem of the Allies begins to vanish. Aside from the general effect of a decrease in the number of submarines, officials look for it to have a decided effect on German morale. Every submarine sent to the bottom carries with it a trained crew, which is becoming increasingly harder to replace.

In February and April the number of submarines destroyed was three less than the total destroyed in the previous three months. These results, the minister declared, were due to the methodical character of the war against submarines; to close co-ordination of the allied navies; to the intrepidity and spirit animating the officers and crews of naval and aerial squadrons and to the intensification of the use of old methods and the employment of new ones.

"The situation is most favorable," the minister continued, "but it does not authorize the slackening of effort. It is necessary to redouble it, as the enemy has put new submersibles into service and is trying a fresh offensive, in which he plays his last stake."—*Washington Evening Star*, 13/5.

MILITARY

THE GERMAN PURPOSE.—"Their purpose is undoubtedly to make all the Slavic peoples, all the free and ambitious nations of the Baltic peninsula, all the lands that Turkey has dominated and misruled, subject to their will and ambition, and build upon that domination an empire of force upon which they fancy that they can erect an empire of gain and commercial supremacy—an empire as hostile to the Americas as to the Europe which it will overawe—an empire which will ultimately master Persia, India, and the peoples of the Far East. In such a program our ideals, the ideals of justice and humanity and liberty, the principle of the free self-determination of nations upon which all the modern world insists, can play no part. They are rejected for the ideals of power, for the principle that the strong must rule the weak; that trade must follow the flag, whether those to whom it is taken welcome it or not; that the peoples of the world are to be made subject to the patronage and overlordship of those who have the power to enfore it."—*The President's Baltimore address.—Notice to Mariners*, 20/4.

CHASED FROM EAST AFRICA.—*Germans Still in Flight, Pursued by British and Portugese.*—London, April 27.—Reporting military operations in the East African battle zone, an official statement issued to-day by the War Office says that the advance of the British and Portuguese forces, which are pursuing the German troops, which crossed the German East African border into Mozambique, is proceeding under more favorable weather conditions. The text of the statement reads:

Since April 17 the convergent advance of General Northey and General Edwards' troops has proceeded under better weather conditions. The main enemy force is in the vicinity of Namungo. British and Portuguese troops are moving in the direction of Msalu River, while further south other British and Portuguese columns have been disposed north and south of the River Lurio.—*N. Y. Herald*, 28/4.

INTERNED GERMANS OVERPOWER DUTCH GUARDS; 1000 FLEE.—*Report of Ultimatum to Holland Causes Uprising in Which Many Escape.*—Amsterdam, Sunday.—The report current last week that Germany had sent an ultimatum to Holland led to a revolt among Germans interned at the Vapanveld camp, according to a dispatch from Hattem, Holland, to the *Het Volk.*

The guards are said to have been overpowered by 1000 Germans, who fled in all directions. Frontier points were notified immediately and mounted police searched the countryside.

Many Germans succeeded in passing through Almelo or Hengelo on the way back to Germany, but the police rounded up the majority of them in groups of 25 or 50.—*Baltimore Evening Sun, 27/4.*

STRICTER WATCH BY DUTCH ON FOREIGNERS.—London, Saturday.—A bill introduced in the Dutch Parliament contains provisions for stricter supervision of foreigners resident in Holland during the present extraordinary war situation, according to a Reuter dispatch from The Hague. As it is considered that there are various objections to the expulsion of foreigners and as there may be undesirable elements among them, special regulations relative to them are believed to be necessary.—*Baltimore Evening Sun, 27/4.*

GENERAL BELIN HEADS VERSAILLES COUNCIL.—The Versailles Interallied War Committee, according to an official despatch from France, is henceforth to be constituted as follows: President, General Belin, France; members, General Sackville-West, for Great Britain; General Dirobilant, for Italy, and General Bliss for the United States.—*N. Y. Herald, 23/4.*

GERMAN PRISONERS TO WORK ON ROADS.—The War Department plans soon to offer to the states an opportunity to obtain as road builders German prisoners held in this country. Some of these men are already engaged in road construction in the vicinity of Forts McPherson and Oglethorpe, Ga., but the department intends to enlarge the scope of this and permit states to bid for their services.

States obtaining the prisoners must pay their maintenance, but the government will pay for guards, medical attendance and other incidentals, including a small amount of money for tobacco and the like.

Only Enlisted Men to Be Used.—Only enlisted men will come under the plan, for under The Hague conventions officers are exempt from manual labor.

At present this government is negotiating with Berlin through the Spanish representatives over questions of pay, so that there will be no inequality between the amounts Germany pays American officers and what we pay German officers.

The department has plans for supplying a distinctive uniform to the prisoners.

Some Want to Stay Here.—German prisoners like the United States and don't want to go back to Germany. It was learned to-day that some of them had secretly inquired from the War Department if they could remain in this country after the war and had expressed a dread of returning to the Fatherland.

The appeals carried the strong suggestion that the men were tired of Teuton militarism and pleased with American treatment and American freedom.

The War Department replied to their inquiries that it was unable now to announce a policy on that question. It is known, however, that the present plans are to return all prisoners to Germany when the struggle ends.—*Baltimore Evening Sun, 22/4.*

GIVES GERMAN REGULATIONS REGARDING REMITTANCES TO CIVIL AND MILITARY PRISONERS.—The War Department authorizes the following:

The following telegram has been received from the American minister at Berne, Switzerland, regarding regulations in force in Germany with respect to remittances from their home countries to interned civilians and prisoners of war:

"The Spanish ambassador at Berlin has transmitted a note dated February 15, 1918, from the German War Department, stating that there are no restrictions in regard to the remittance of money for civilian and military prisoners. The money sent is placed to the prisoner's credit, who may spend it freely with the following limitations:

"A. Military prisoners.

"1. Sixty marks weekly may be spent by officers and others of similar rank.

"2. Fifty marks weekly by non-commissioned officers and men.

"B. Civilian prisoners.

"1. Sixty marks weekly for men of better social position.

"2. Fifty marks weekly for others.

"With a view to obtaining particular articles, the prisoners are allowed at any time to draw on their credit."

No Guarantee of Delivery.—All moneys thus sent to interned civilians and prisoners of war should be remitted through the Bureau of Prisoners' Relief, American Red Cross, Washington, D. C. All money thus sent through the Red Cross should be remitted in the form of check or postal money order, payable to the American Red Cross. The information is imparted to all concerned that, while the American Red Cross has handled many such remittances and will be glad to handle all future remittances of a similar nature, no guarantee can be given as to the ultimate safe delivery of such remittances. It is also noted for the information of all concerned that remittances so made will probably not be delivered to addresses by the German Government in the form of cash, but rather in the form of credit on prison exchanges.—*Official Bulletin*, 29/4.

The British report of the action in the Struma Valley on April 16 shows that Greek troops did well, and reconquered several villages ceded to the Bulgarians under the old régime. To the north of the Greeks, British troops gained two villages to the southwest of Demir Hissar.—*London Times*, 18/4.

MR. WILSON'S GREAT STROKE.—By Arthur Pollen.—I doubt if the majority of English people really appreciate the full significance of what President Wilson, seemingly at the suggestion of General Pershing, has decided to do, not only with the American troops in France, but with all the troops that can be got to France in the immediate future.

The decision in itself is that the American battalions are to be brigaded as occasion requires with the French and British battalions, and to be sent into the firing line—of course, under their own colonels, majors, and company officers, but—as units controlled by French or British Brigadier-Generals of Division and so upwards. To many people, the President seems, in this, first to have done no more than meet a very clear necessity of the situation, and, secondly, only to be following a course for which he himself and the British Admiralty have already supplied precedents. As to the first point, I see it stated that there are in France a large number of American troops available for the purposes designated, a number which must very much exceed the total of the allied losses in the battle which still continues.

Of the timely value of this reinforcement there can be no two opinions. As to the second, a precedent for the principle involved has existed for several months in the case of the American destroyers operating in the Atlantic under the ultimate command of one of the most experienced and most brilliant of our senior admirals. They are, of course, only part of the forces at the disposal of this officer, and to make the analogy complete, Admiral Sims commanded the entire combined forces himself for a period

This reciprocal action by the governments of the United States and Great Britain is, I believe, entirely without parallel in history. It has often happened that allied forces have worked together under a Generalissimo, but in each case every unit, and every individual in it, looked to the national commander-in-chief for orders. What was unique in this Anglo-American naval arrangement was that the captains and officers of English and American ships came under the direct orders of an officer not of their own nationality. Those who have been privileged to see at first hand how this arrangement has worked in practice have been deeply impressed by the skill and tact, no less than by the fine warlike and patriotic spirit which has alone made its complete success possible. And it is not a far-fetched idea to suppose that the real authors of President Wilson's epoch-making decision are Rear Admiral Sir Lewis Bayley, Vice Admiral Sims, and the officers and men of both nationalities who have served under them.

But, precedent or no precedent, the case of the army is in reality an infinitely more striking affair. For seamen are as a race apart. The long training and the sustained self-devotion necessary to gain mastery of a science and a craft incomprehensible to the lay segregate the sailor so completely from the landsman that when a common cause bids them unite forces, it is almost easier for English naval officers to feel the bond of brotherhood with American colleagues than with brother Englishmen not of their own high and select calling. The professional training of the soldier confers no parallel aloofness and, where you have the citizen soldier, there is almost no qualification of his purely national prejudices and characteristics. Without question, every American who volunteered for this war—and nine out of ten of those in France must be men who had gone into training before the draft came into force—did so to become a member of a purely American force, to fight under the Stars and Stripes for the credit and glory of his own country, to be commanded by American generals, and to be led and directed by an American staff.

To sacrifice so much of this ideal, to consent to so much of the merging of so much of the national identity—this would be extraordinary in any event. It approximates to the heroic in the case of a nation so singularly self-conscious of its nationality. The President has not, of course, by any means abandoned the building up of an American Army with its whole apparatus of generals, staff, and so forth. But the decision not to wait for the realization of this plan before enabling his ardent countrymen to strike a blow for justice and freedom, has necessarily postponed the army's creation, and to do this called for moral courage of a very high order. It is a thing that claims our sincere gratitude, and not the least of its many pleasing aspects is the very obvious satisfaction of the people of America with their President's decision.

Three months ago, in these columns, I offered my tribute to the unlimited willingness of the American people to make every effort and every sacrifice demanded of them for victory; but it did not occur to me that this particular demand would so soon be made. But circumstances have made it necessary, and great and unusual as the event is, those who realize that America's determination to fight and not stop fighting till victory is won, will not be surprised that the President has not hesitated to do what to a more narrow view of national dignity would have seemed prohibitive, or that the nation as a whole should have endorsed this finer vision with unanimous enthusiasm.—*Land and Water*, 11/4.

MILITARY CRITIC ON NEXT PHASE OF THE GREAT BATTLE.—By Military Expert.—Just what Germany's plans for a renewal of the German offensive are no one can even make an intelligent guess. Her situation in the west is far from being comfortable and is one that cannot be maintained without a material change in the formation of her battleline.

To drive a salient into an enemy's lines is often an advantage if it is followed up by a widening process which gives the troops which occupy

it space in which to maneuver. But if it cannot be widened it is apt to be a source of extreme danger. This is the general situation which confronts the Germans both in the north and in the south. Whatever their plans must be, therefore, they must involve a widening of the bases of the two salients.

In the north the situation is peculiarly exacting by virtue of the depth of the wedge in relation to the short distance between the heels at the base. This is further aggravated by the topographical advantages which are against the Germans. Beginning at Messines Ridge and extending west, there is a long line of hill positions, all of which the Allies hold except the most easterly point at Kemmel Hill. Beginning at Vimy Ridge and extending northwest there is another ridge jutting out of the plains, all of which is in British hands. Between these two ridges are the Germans. They cannot advance at the point, as matters stand, since the further westward they go the sharper becomes the point of the wedge and the closer to its sides are the two ridges which eventually almost meet. The Germans cannot stand still, because they are down in the plain of French Flanders where every move they make is visible to the Allies on the northern bank of heights. It is impossible for them to make any concentrations of men or of guns, for, at the first attempts, they will come immediately under the fire of the British and French artillery on the heights.

On the southern leg of the salient the same situation exists. In fact, there is scarcely a point which from one side or the other does not come within the vision of the allied observation posts. Since, then, Germany cannot advance at the point and cannot remain where she is, there remains the problem of breaking through one of the sides and so extending the possible front of operation.

Fighting in the North.—The fighting which took place about this northern salient during the week was apparently designed to secure a local betterment of position, and, at the same time, to feel out the British strength at various points. The principal one of these attacks was on the Flanders front between La Clytte and Voormezeele. The Germans in this attack used two divisions and, while the attacks on the two flanks of the front engaged were not pushed, that in the center continued for several days.

The main point of attack was about Vierstraat. This village is located near the tip of the spur which branches off from the main ridge between Messines and Kemmel toward the eastern side of Lake Dickebusch. It is limited on the north by Ridge Wood, a small clump of trees about which there has been the heaviest kind of fighting since the German offensive in Flanders began. The object of the Germans here was to push the British off this high ground down into the plain on the north. This would have represented a gain of but a few hundred yards, but it would have put the Germans further to the rear of the Mont Scherpenberg positions, which would in itself have placed them in a much better position for a subsequent attack when the offensive on a large scale reopened.

At the central point of the attack the Germans succeeded in forcing their way forward, but somewhat later a counter attack restored the British lines and the fighting ceased without result. Later another attack was delivered a little further west, just north of Kemmel. This attack passed through the same stages as did the first. There was an initial gain followed by a counter effort which restored the old positions, after which the fighting died down. The week's result is that, on this front, there has been no change in the situation.

Allies Gain in South.—In the south the initiative has been with the Allies during the whole week. The British have maintained a more or less consistent pressure against the German lines between the Somme and the Ancre and between the Somme and the Avre. The allied lines here have been pushed eastward somewhat and the positions bettered through obtaining a firmer grip on the various plateaus across which the lines run. The general situation, however, is much the same as it was last week.

The persistent inactivity of the last two weeks has in a measure left us completely in the dark as to just what is happening or is about to happen. The Germans, it would appear, had, as their greatest chance of success, speed in the attack, following up each blow with another, leaving no appreciable intermission between them. Delay, it was argued, would be fatal, as it would give the Allies a chance to dig in and make the German task much more difficult than it was when the offensive began.

There is, of course, an element of truth in this. Obviously the Allies can no longer be taken by surprise. The German attack, when it is resumed, must follow along the line of previous efforts, and be kept within the narrow limits fixed by the Germans themselves. It would not in any way further the consummation of their plans for them to strike in a new quarter. It would, indeed, be but a confession of their own weakness and an admission that their great offensive, which had been so widely advertised, was a failure. It is known, then, that the attack must come either in Flanders or along the Somme fronts. The situation in Flanders is well understood. The Germans must break through one or the other of the line of heights by which they are penned in.

Situation Around Amiens.—On the southern front the situation is much more simple, at least up to a certain point. Between the Ancre and the Noye Rivers, which territory is the vital sector of the southern part of the line, the country is very heavily rolling and is well cut up with streams of varying size, all, however, radiating to a common center—the Somme between Moreuil and Amiens. There is a series of angles formed by the various river junctions into which the Germans must go. They are astride all of the streams except the Noye River, a fact which, of course, operates in their favor, as the rivers cannot be considered as defensive barriers behind which the Allies, if forced to retreat, can take refuge. At the same time there is the disadvantage of inability to secure close co-operation between the various army groups into which the rivers divide the German line. The banks of all the streams in question have the same characteristics.

The ground rises very sharply from the banks until it reaches a plateau of considerable size, the plateaus being crossed by the battlelines, as these lines extend from north to south. There are, consequently, many good defensive positions to which retirement can be made if need be. The principal difficulty of the German position, however, is not the defensive position behind which the Allies can stand if driven out of their present lines, but the apparent advantage of being astride of the rivers.

In order to throw the Allies into the state of confusion necessary for a material advance in this section of the front, the Germans cannot content themselves with an advance into any single one of the angles between the rivers. To do this would merely create a number of sharp definitely limited salients, each of which would be a point of danger by reason of the fact that it could be practically ruined by artillery fire from all sides. And yet, to advance on a wide front, is an operation which requires the closest kind of co-operation between all units. It is difficult to see just how such co-operation is obtainable in a line divided into numerous parts by topographical obstacles. Nevertheless, it is consistently reported that the bulk of the German forces in France is concentrated on the Somme front between the Somme and Arras.

This is certainly a most important section of the line. Bitter fighting lasted about Bucquoy for many days. This fighting was designed to flank the defences of Arras—the heights of Notre Dame de Lorette and of Vimy. It is upon these defences that the British strength on the southern side of the Flanders front rests. This, therefore, would be a logical point of attack, as it would accomplish, if successful, the double object of widening both the Flanders salient and the front on the south. There has been no indication, however, other than the reported concentration of German divisions, that this is the section which is to receive the next German blow. It has, indeed, been the most quiet sector of all the long German front of attack.

There have been numerous bombardments along other parts of the line. In Flanders, at all points of the salient and particularly along the river Lys near where it divides the battleline, between the Somme and the Avre and along the Avre, there have been periods of heavy cannonading. But the section north of the Somme has been almost entirely free from molestation. But this is without any special significance, since, if the Germans intended to attack on this front, there would not necessarily be much artillery firing until the attack was about to be launched.

May Foe Attack in Italy?—There is the feeling in some quarters that the Germans, realizing that they are held fast on the front in France, are preparing a diversion from the real point of attack and are concentrating for an attack against Italy through the Trentino. This does not appear likely. It is entirely possible that an offensive against Italy may break out. But it is not probable that this will mean a cessation of the fighting in France. While the Germans have met with a check, and a very decided check at that, they have not yet been defeated by any means, but, on the contrary, still possess the ability to strike again and with practically the same strength as they did six weeks ago. They surely are not ready to acknowledge the defeat of their great effort to end the war.

To attack Italy at the expense of the front in France would be equivalent to such an acknowledgment. Germany cannot do both. In spite of the fact that practically all of her available forces are concentrated in the west, she has not sufficient strength to conduct two such offensives at the same time. She never has had. In every case where an offensive was in progress it was the signal for a period of quiet on the unaffected front. If Germany did not have the numerical strength to attack both Russia and the western allies at the same time, certainly now she has not enough men to initiate an offensive on the entire western front or at two parts of it so widely separated as are France and Italy. If, therefore, an attack against Italy is staged—and there have been indications that it is preparing—it will be conducted by the Austrians without any great assistance from Germany.

Cavalry in the Great Battle.—The relative inactivity during the past week affords an opportunity to mention a most interesting fact connected with the great battle which began on March 21. It has been generally assumed that the day of cavalry lapsed with the invention of the machine-gun and the airplane. We have heard little if anything of the cavalry arm since the early days of the war, when the movement of troops ceased to be rapid and degenerated, so to speak, into the dogged persistence of the trenches. General French was criticized on more than one occasion because he persisted in keeping intact a large cavalry force safely in rear of his army for which there was no apparent use.

But cavalry has been used in trench warfare, and most brilliantly used. The cavalry pursued the Germans in their retreat in the early part of 1917 and kept closely in touch with them during the whole of their retrograde movement. The cavalry operations in the back of Cambrai, both in the British attack and in the subsequent German attack, were among the most brilliant exploits of the war. And, in the present great battle, it was the cavalry of the French which maintained connection between the right flank of the British and the French left, and which in large measure prevented the Germans from accomplishing their object of dividing the two forces and rolling up the British line.

In the early days of this attack, it will be remembered, the Germans were pushing southward against the French, who were in retreat between Roye and Montdidier, while the British were retreating westward, north of this line. Here was the danger of the break in the continuity of the line. There was, indeed, a rupture, and for a time the German plan promised success. But the French cavalry stepped into the breach, re-established the connection, and fought both as mounted infantry and as a cavalry until reinforcements of infantry came up and took over the line. This

was really the turning point of the battle, as once a definite, positive connection between the two allied armies was made, the danger that the German attack would succeed ceased.

It was largely a question of mobility, and, in many of the battles of this war, just as in many in past wars, the great mobility of a cavalry force has been utilized in stiffening a vital section of a battleline where disaster threatened. Though the development of trench warfare has undoubtedly restricted the usefulness of cavalry, it must still remain an important military arm.—*New York Times*, 12/5.

OUTCOME OF GREAT BATTLE IN FRANCE HINGING ON MAN POWER; AMERICA MUST RUSH HELP, SAYS WAR DEPARTMENT REVIEW.—The War Department authorizes publication of the following review of military operations for the week ending April 27, 1918:

The outcome of the present operations in the west depends on man power.

The Germans are relying principally on rifles, machine-guns, man power, and carefully thought-out methods of transporting and supplying munitions to the front of attack under all conditions; which means that they have developed mobility of offensive action that can only be met by countermeasures of equal potency and flexibility.

A battle of such magnitude as the one being fought in the west cannot be decided by any single engagement, yet there arise a series of crises on which the ultimate outcome depends. These crises have up to the present in a large measure resulted favorably to the enemy.

The vigorous attacks driven against the British lines were intended to paralyze the independent will power of the British command. In this the enemy has failed. Unity of command of the Allies has extended operations to the broader field of general engagements in which all the allied forces will henceforth be used interchangeably.

This change in the combat situation has materially altered the moment of decision of the offensive. Instead of the enemy being able to defeat the British Army, and then turn its full energy against the French, the Allies are now able to oppose their full united strength to the hostile attack.

It must constantly be borne in mind that the enemy is seeking a decision that will end the war. This decision can only be arrived at by the destruction of the allied forces in the field before fresh units contributed from additional levies in France and Great Britain, as well as by our own troops, can take up their position in sufficient numbers to turn the German successes to defeat.

Ours is the imperative duty of providing replacement units for the armies in France. We must be able to put fresh men in the field thoroughly and methodically trained. In addition to those already called to the colors and now in training at our cantonments, or already selected for service, very large quotas will be required in the immediate future to fill the gaps.

Operations of the week reveal that the enemy, taking advantage of the reentering angles stretching from the Avre northward and from Wytschaete to Dranoutre, has resumed operations after a period of relative calm.

German Aims Clearly Defined.—It is not difficult to follow the strategic conception of the German higher command. An enveloping movement is outlined, which, on the one hand, is to force the retirement of the British from Arras, and, if wholly successful, result in the capture of both Arras and Amiens. On the other, by the occupation of the important heights of Kemmel to wipe out the Ypres salient and throw the British line back of Hazebrouck and Poperinghe.

In the south the thrusts toward Amiens have been well contained. The British are holding firmly in the face of furious assaults.

Hangard has been the scene of very violent engagements and the enemy is here pressing the attack with great vigor. Ailly-sur-Noye and the surrounding area have been subjected to very intense bombardments and Amiens itself is being consistently shelled.

Our own forces have taken part in the battle. American units are in action in the area east of Amiens. During the various engagements which have raged in this area they have acquitted themselves well.

In Flanders the situation is less satisfactory. Last week the Germans drove a strong thrust against the segment of the line held by the Belgians. This was well met and the enemy was unable to make any headway. After a delay, during which the Germans replaced their depleted units and brought up supplies and munitions, another principal assault was launched with Mount Kemmel as its objective. In the region from the Ypres-Comines Canal to Dranoutre violent fighting has again developed, as a result of which the enemy was able to capture Dranoutre, gain the summit of Kemmel, and reach Locre. Fighting continues in this area with unprecedented stubbornness and the advance of the enemy has not been definitely checked.

The loss of Mount Kemmel is a serious menace to the British dispositions in Flanders.

Along other sectors of the front there was relatively little activity. Rheims was again subjected to a very severe bombardment and the enemy launched several unsuccessful thrusts in this area.

Northwest of Toul enemy pressure is increasing. At dawn on the 21st, after a powerful preliminary barrage, the Germans launched a heavy raid against the sector held by our men.

On a frontage of approximately 3 kilometers, in the vicinity of Seicheprey, the enemy swept over our front lines. Our men were driven out of the village which the enemy was able to hold temporarily. During the night the Germans evacuated the positions captured and we were able to reoccupy our original front lines. Along the Meuse our troops beat off another raid.

Allied aircraft was particularly active and executed a large number of raids on depots and other points of importance in the Picardy and Flanders salients.

In the Italian theater no important change in the situation took place. Reports of the Austrian offensive, which may be undertaken in the near future, are noted. Along the Piave and Asiago Plateau artillery duels continued throughout the week and small local attacks were unsuccessfully attempted by the enemy at one of two points.

An Austrian detachment endeavoring to advance west of the Brenta was dispersed.

More important news reaches us from the eastern theater this week. British and French troops have landed at Murmansk, on the Arctic coast, and are assisting the Bolsheviki and Russian Red Guards in protecting the coast and Kola Railway from attacks by the White Guards. The White Guards, supported by the Germans, made an attempt to cut the railway near Kem. In southern Finland, the Finno-German forces are still making headway. Viborg is the only city now remaining in the hands of the Red Guards.

In Southern Russia.—In southern Russia, the enemy has occupied Perekop and has advanced southward into the Crimea, having occupied Simferopol thereby gaining control of the railway which connects Sebastopol with the mainland of Russia.

In the Balkans considerable activity prevailed.

At Cerna Bend enemy detachments attacked the Italian line but were forced to withdraw. General fighting has developed along the whole front. The allied forces executed a number of destructive raids, especially south of Dorian.

The most important engagement of the week took place in the region of the Mount Vetrenik. This height was stormed by Serbian units and, in spite of the formidable entrenched positions along the crest, was occupied by the Serbs.—*Official Bulletin*, 29/4.

GREAT ZEPPELIN PLANT AT FRIEDRICHSHAFEN REPORTED DESTROYED FROM AIR.—In addition to the destruction by fire of the German airplane plant at Manzell, reported several days ago, the Zeppelin factory at Friedrichshafen is said to have been burned down.

According to dispatches just received from Romanshorn, the fires were caused by aerial attacks, and 150 workmen were killed or injured.

The raiding airplanes were seen from the shore of Lake Constance as they flew northward over the lake after the attack.

The amount of damage is said to have been enormous.—*Baltimore Sun*, 21/4.

POWDER FACTORIES EXPLODE IN AUSTRIA.—German newspapers received at Zurich say that two large power factories at Glasenbach, near Salzburg, 156 miles southwest of Vienna, have been destroyed, according to a dispatch to the Exchange Telegraph Company from Switzerland. The explosions, which are believed to have been caused by incendiaries, are said to have resulted in heavy casualties.—*N. Y. Herald*, 25/4.

ONE BIG GUN BLOWN UP.—A description of the destruction by French artillery of one of the long-range cannon, with which the Germans have been bombarding Paris, is published to-day by the *Petit Parisien*.

"All the signs that Bertha (a French nickname for the big German guns, referring to Bertha Krupp), was going to fire had been noticed. The smoke curtain had gone up. All around there was a chorus of loud reports. Undoubtedly, Bertha and two or three hundred 70-millimeter naval guns were all firing simultaneously to disguise the whereabouts of the big cannon.

"After a short pause the firing was resumed. This time 10 naval guns supplied the obbligato. French air observers were on the lookout, however, and French guns opened fire in their turn. The aviators signaled quickly that the result of the first salvo was most promising. Two heavy shells exploded 250 yards north of the big gun, tearing up the railroad tracks leading to the concrete gun platform. The firing was continued, getting closer and closer, until finally two enormous shells went through the camouflage. Two formidable explosions were heard and the discomfited Germans saw Bertha damaged beyond repair, with a rent 50 feet long in the barrel. The aviators reported that they could see plainly through the camouflage two gaping craters in the platform.

"French gunners then set about preparing to destroy the third Bertha, but thus far they have not succeeded, for shells arrived in Paris again during the small hours of the night."—*Baltimore Sun*, 28/4.

ITALIANS IN FRANCE, PREMIER ANNOUNCES.—Premier Orlando announced in the Chamber of Deputies that Italian troops would be despatched to the battle front in France.

The announcement, which was received with a storm of applause, was as follows:

"Italy, which follows with admiration the heroic efforts of the Anglo-French troops on the western front, could not remain absent from the battlefields of France. She wishes to bring to her allies tangible proof of solidarity, and very soon the colors of Italian regiments will fly over the fields of Picardy beside those of the French, British, American, Belgian and Portuguese, thus sealing the union which exists between the allied peoples and governments."—*N. Y. Herald*, 20/4.

MUNITION LOSSES VAST.—*But Churchill Says They Have All Been Made More Than Good.*—Winston Spencer Churchill, introducing in the House of Commons to-day the estimates for the Ministry of Munitions, of which he is the head, said that during the five weeks since the battle in France had opened they had been passing through the greatest strain, regarding the supply of war material, that had occurred in the experience of the ministry. Not only had the consumption and destruction of munitions of all kinds been proceeding at the greatest rate, but there were also very heavy loses by capture by the enemy.

"We lost," the minister said, "nearly 1000 guns by shell fire or capture; between 4000 and 5000 machine-guns have been lost or destroyed, and the quantity of ammunition, apart from that which has been fired and that which has been lost in the dumps, amounted to something between one and three weeks' total of manufacture.

"Other war materials have been used or lost in a great variety of classes and on a similar scale, but by the end of last week all the losses had been made good, and, in many cases, more than made good.

"Vast quantities of small arms ammunition have been lost or left behind, but great as the demand has been, the expenditure in the last month did not exceed the maximum potential capacity of the British factories, without touching enormous reserves which had accumulated against such a contingency. The wastage of rifles was very great, but the losses were quite easily and promptly made good.

"Our preparations had contemplated a period of supreme battle intensity from the third week of February instead of from the third week of March, so we are at present from one to three weeks to the good.

"In fact, barring unforeseen circumstances, our supply of munitions would enable us to carry on a battle at the supreme pitch of intensity until winter without compromising our requirement for 1919. This is despite the fact that 100,000 men were taken from munition factories for service in the army.

"We are making in a single week more airplanes than we made in the whole of 1914; in a single month more than we made in the whole of 1915; in three months more than we made in the whole of 1916. And we are going to make this year several times what we made last year."—*Baltimore Sun*, 26/4.

INDEX OF WAR VESSEL LOSSES MENTIONED IN THIS NUMBER

BRITISH VESSELS

1 minesweeper 1389
1 destroyer *North Star* 1383
1 submarine and 6 old cruisers sunk off Zeebrugge and Ostend:
- *Thetis* 1380
- *Intrepid* .. 1380
- *Iphigenia* .. 1380
- *Sirius* 1380
- *Brilliant* .. 1380
- *Vindictive* 1380

Destroyers 1369
7 submarines 1390

GERMAN VESSELS

10 trawlers 1377
Submarines 1297, 1371, 1389
Destroyer 1380

AUSTRIAN VESSELS

1 battleship (*Viribus Unitis* class) 1394
1 torpedo-boat 1394

UNITED STATES VESSELS

1 scout vessel No. 967..... 1372
1 transport *Zaanland* 1372

DIPLOMATIC NOTES

FROM APRIL 18 TO MAY 18

PREPARED BY

ALLAN WESTCOTT, PH. D., Instructor, U. S. Naval Academy

TEUTON PEACE OFFERS INSINCERE

CONQUEST AND EXPLOITATION IN GERMAN TERMS.—In an address in New York on May 18, President Wilson spoke as follows of the prosecution of the war and the emptiness of German peace offers:

There are two duties with which we are face to face. The first duty is to win the war. (Great applause.) And the second duty, that goes hand in hand with it, is to win it greatly and worthily (applause), showing the real quality of our power not only, but the real quality of our purpose and of ourselves. Of course, the first duty, the duty that we must keep in the foreground of our thought until it is accomplished, is to win the war. I have heard gentlemen recently say that we must get five million men ready. Why limit it to five million? (Great applause.)

I have asked the Congress of the United States to name no limit (applause) because the Congress intends, I am sure, as we all intend, that every ship that can carry men or supplies shall go laden upon every voyage with every man and every supply she can carry. (Applause.) And we are not to be diverted from the grim purpose of winning the war by any insincere approaches upon the subject of peace. I can say with a clear conscience that I have tested those intimations, and have found them insincere. (Applause.) I now recognize them for what they are, an opportunity to have a free hand, particularly in the East, to carry out purposes of conquest and exploitation.

Every proposal with regard to accomodation in the West involves a reservation with regard to the East. Now, so far as I am concerned, I intend to stand by Russia as well as France. The helpless and the friendless are the very ones that need friends and succor, and if any man in Germany thinks we are going to sacrifice anybody for our own sake, I tell them now they are mistaken. For the glory of this war, my fellow-citizens, so far as we are concerned, is that it is, perhaps for the first time in history, an unselfish war. (Applause.) I could not be proud to fight for a selfish purpose, but I can be proud to fight for mankind. (Applause.) If they wish peace let them come forward through accredited representatives and lay their terms on the table. (Applause.) We have laid ours and they know what they are. (Applause.)

MR. BALFOUR ON EMPEROR CHARLES' PEACE LETTER.—The true purport of the Emperor Charles' letter to Prince Sixtus, recently revealed by the French Government, was apparently an offer to France to abandon Italy, in return for which the Emperor suggested, whether honestly or not, that he would withdraw his support of Germany. As stated by Mr. Balfour in the House of Commons on May 16, the letter was sent with strict injunctions that it should be revealed only to France and Great Britain, and not to Italy or the United States. Mr. Balfour said further that "if any belligerent country desires seriously to lay before us any proposals, we are ready to listen to them," and "we are not going to deal with them without the recognizance of our allies."

Mr. Clemenceau, according to Mr. Balfour, had exposed the falsehood that the war was being waged in order that France might obtain Alsace-Lorraine while Italy should have no consideration. Mr. Balfour added that an extended Alsace-Lorraine was not a subject which should be considered seriously.

THE CENTRAL POWERS

MEETING OF EMPERORS STRENGTHENS GERMAN CONTROL.—On Sunday, May 12, the Emperor Charles, accompanied by Foreign Minister Burian, visited the Kaiser at the German Great Headquarters. While the nature of the agreements reached at this conference was not clearly revealed, it appears that in return for a free hand in Poland, Austria bound herself more closely to Germany for a period variously stated from 15 to 25 years. Referring to the conference, the German Chancellor, Count von Hertling, spoke as follows to the Berlin correspondent of the Budapest newspaper *Az Est*:

The new dual alliance will comprise two important sections, namely, economic and military agreements. The economic agreement of Germany and Austria-Hungary is not aimed at any state whatever. We are quite entitled to harmonize our common interests and act together. We desire to utilize the possibilities which this union, and nothing else, can give us.

With regard to the military side of the discussions I must emphasize that our agreements for the future have no aggressive character. We only desire consolidation of our present relations. We also desire to remain just as closely bound together after the war as during the war, which has drawn us together.—*N. Y. Times*, 19/5.

London, May 15.—Germany, in the course of the recent conference of Emperors William and Charles, agreed to the solution of the Polish question desired by Austria, on condition that Austria-Hungary conclude a 15 years' convention with Germany, according to a Vienna dispatch to the Berlin *Lokal-Anzieger*, received in Amsterdam. Complete union between Austria-Hungary and Poland may shortly be expected, the message adds.

German newspapers say, according to an Exchange Telegraph dispatch from Copenhagen, that the Emperors selected monarchs for Lithuania, Courland, Esthonia, and Poland.

A Vienna dispatch to the Munich *Neueste Nachrichten* says that the new Austro-German alliance is fixed for a period of 20 years, includes a military convention, and provides for the closest economic and customs relations.

An official dispatch from Berlin received in Amsterdam to-day says that now that the main lines for the cementing of the alliance between Germany and Austria have been fixed, the political, military, and economic negotiations will doubtless begin shortly. It is obvious, adds the dispatch, that the political and military arrangements can be carried through faster than the economic, which will probably take several months to complete.

The phrase in the official report of the Emperors' conference regarding the consolidation and deepening of the alliance, says the Berlin *Tageblatt*, permits the assumption that the aim of the convention is a close military and political union and a complete blending of military resources.

CRISIS THREATENED IN AUSTRIA.—At the close of the week ending May 5, the Emperor Charles ordered the indefinite adjournment of the Austrian Parliament owing to Jugo-Slav and Czech agitation and inability of the government to curb parliamentary discussion. According to dispatches of

May 7, Premier Wekerle, head of the retiring Hungarian Ministry, was requested to form a new cabinet, and was given power, in case of failure to secure a parlimentary majority, to dissolve the Hungarian Parliament and either issue writs for a new election or post-pone elections until after the war.

The Socialist Vienna *Arbeiter Zeitung* turned strongly anti-imperialist and ridiculed the device of solving the crisis by proroguing Parliament. Reports from Germany of May 9 stated that this paper for two weeks had been barred from Germany.

Amsterdam, May 9.—Austria-Hungary, says one German journal, is "heading for disaster," while another declares that the country is going at ever-increasing speed toward a catastrophe. The *Kreuz Zeitung* says that Kaiser Charles' realm is "being shaken by a severe crisis, which this time goes far beyond parliamentary limits."

It is significant that the Vienna *Neue Freie Presse* is calling for energetic measures against the Southern Slav "menace," and that it views the political co-operation between the Southern Slavs and the Czechs with considerable alarm and as a danger to the monarchy. The tone of the article would suggest a situation on the southern confines of the dual monarchy infinitely more serious than is imagined by the public.—*N. Y. Times*, 10/5.

PRUSSIAN FRANCHISE REFORM HINDERED.—Reactionary elements in both the Upper and Lower Houses of the Prussian Parliament have adopted various devices to delay or emasculate the Franchise Reform measure approved by the Kaiser in his rescript of July last. A motion to restore the paragraph providing equal suffrage, which had been removed in committee, was twice defeated in the Lower House.

REFORM MOVEMENTS IN EUROPE.—With Prussian electoral reform hanging in the balance, a review of recent democratic progress in other parts of Europe shows how strikingly Germany will contrast with her neighbors if the clock is set back, not forward. We may put Russia to one side. Sweden has just seen the downfall of the Conservative Ministry because it would not consent to a revision of the constitution; the new ministry is a reform ministry, and the King's speech at the opening of the Riksdag, which included mention of woman suffrage and equality in the communal franchise, declared the necessity of "strengthening our people through extended political rights and far-sighted social reforms." During the war Denmark has completed the democratization of her constitution. In Holland universal suffrage has been adopted under a plan which at last separates the voters' roll from the tax roll. In Rumania, Premier Bratiano announced last May the government's decision in favor of universal suffrage and other reforms, and when peace is fully restored there is little doubt that just changes urged since the Congress of Berlin will be made. The struggle for universal suffrage in Hungary is steadily pushing the opposition back. Junkers like Count Spee may talk defiantly, but if they will only look outside their chamber they will realize—even thrusting the issue of the war out of consideration—what a Mrs. Partington rôle they play.—*N. Y. Nation*, 11/5.

SIGNIFICANCE OF THE LICHNOWSKY MEMORANDUM

In the summer of 1916 Prince Lichnowsky, German Ambassador to England from 1912 to 1914, prepared a secret memorandum giving his version of Anglo-German relations and negotiations up to the outbreak of war.

Several copies were prepared for private circulation, and by what the Prince later described as an "unprecedented breach of confidence" these reached a wider circle and fell into the hands of the Stockholm Socialist paper *Politiken*, which began their publication on March 15. A furious debate arose in the Reichstag next day, and before the close of the month much of the memorandum appeared in the Berlin *Vorwärts* and Münchner *Neueste Nachrichten*. The complete document appeared in the N. Y. *Times* of April 21 and in the May *Times Current History*.

Whether or not their publication in Germany at this time is contrary to the devious policy of the German Government, and if not what the motive for their publication may be, are matters for speculation. Efforts to overthrow the facts stated have at all events been feeble. The memorandum is undoubtedly the work of a German strongly favoring an understanding with Great Britain before the war, not fully in the secrets of the inner circle at Berlin, and humiliated and disgusted by the complete overthrow of his work in London. Incidentally, it should be noted that his Counsellor of the Embassy was von Kühlmann, the present Foreign Minister.

The memorandum almost completely substantiates the allied version of events preceding hostilities. It shows that Great Britain was on the point of concluding with Germany an agreement very favorable to Germany regarding the Bagdad Railway and Portuguese colonies in Africa; that Sir Edward Grey worked sincerely for peace throughout; and that "a hint from Berlin" would have led Austria to accept Serbia's reply.

Some of the striking statements in the memorandum are the following:

"We (the Germans) had always backed horses which it was evident would lose."

"Trade jealousy, so much talked about among us, rests on faulty judgment of circumstances."

"On Aug. 2 (1914), when I saw Asquith in order to make a final attempt, he was completely broken, and, although quite calm, tears ran down his face."

"Of course it would only have needed a hint from Berlin to make Count Berchtold (Austrian Foreign Minister in August, 1914) satisfy himself with a diplomatic success and put up with the Serbian reply."

"The impression became ever stronger that we (Germany) desired war in all circumstances."

"Thus ended my London mission. It was wrecked not by the perfidy of the British, but by the perfidy of our policy."

"I had to support in London a policy which I knew to be fallacious. I was punished for it, for it was a sin against the Holy Ghost."

"As appears from all official publications, without the facts being controverted by our own White Book, which, owing to its poverty and gaps, constitutes a grave self-accusation:

"1. We encouraged Count Berchtold to attack Serbia, although no German interest was involved, and the danger of a world war must have been known to us—whether we knew the text of the ultimatum is a question of complete indifference.

"2. In the days between July 23 and July 30, 1914, when M. Sazonoff emphatically declared that Russia could not tolerate an attack upon Serbia, we rejected the British proposals of mediation, although Serbia, under Russian and British pressure, had accepted almost the whole ultimatum, and although an agreement about the two points in question could easily have been reached, and Count Berchtold was even ready to satisfy himself with the Serbian reply.

"3. On July 30, when Count Berchtold wanted to give way, we, without Austria having been attacked, replied to Russia's mere mobilization by sending an ultimatum to St. Petersburg, and on July 31 we declared war on the Russians, although the Czar had pledged his word that as long as negotiations continued not a man should march—so that we deliberately destroyed the possibility of a peaceful settlement.

"In view of these indisputable facts, it is not surprising that the whole civilized world outside Germany attributes to us the sole guilt for the world war."

"And what result have we to expect from the struggle of people? The United States of Africa will be British, like the United States of America, Australia, and Oceania; and the Latin States of Europe, as I said years ago, will fall into the same relationship to the United Kingdom as the Latin sisters of America to the United States. They will be dominated by the Anglo-Saxon; France, exhausted by the war, will link herself still more closely to Great Britain. In the long run, Spain also will not resist.

"In Asia, the Russians and Japanese will expand with their limitations and their customs, and the South will remain to the British.

"The world will belong to the Anglo-Saxon, the Russian, and the Japanese, and the German will remain alone with Austria and Hungary. His sphere of power will be that of thought and trade, not that of the bureaucrats and the soldiers. The German appeared too late, and the world war has destroyed the last possibility of catching up the lost ground, of founding a Colonial Empire."

GERMAN CONTROL IN RUSSIA

GERMAN PRESSURE ON THE MOSCOW GOVERNMENT.—According to a London statement of May 12, the Russian Foreign Minister, M. Tchitcherin had dispatched a wireless message to the Russian Ambassador in Berlin, M. Joffe, to "try to obtain from Berlin a cessation of every kind of hostility." Other messages assured Germany against hostilities on the part of the Russian Black Sea fleet, which was then at Novorossysk, on the east coast of the Black Sea; and protested against the closing of the Ukrainian frontier to Ukrainians.

Washington, May 14.—Secretary Lansing to-day received from American Minister Morris at Stockholm an unconfirmed Swedish report that Germany had served an ultimatum on the Soviet Government demanding, among other things, the occupation of Moscow and other large Russian cities.

"Swedish press reports from Moscow," said the dispatch, "state that Count von Mirbach recently transmitted to the Commissariat of the People a note formulated as an ultimatum and demanding the immediate effecting of certain financial measures which would practically make Russia a German colony.

"The chief points of the note were the immediate solution of the question regarding the exchange of prisoners, the complete abolishment of armaments, and the dissolution of units formed recently; also the occupation of Moscow and some other large Russian cities."

No confirmation of this report, however, has been received by the State Department through any official source.—*N. Y. Times*, 15/5.

This report was in some measure confirmed by dispatches of May 16 to the effect that Russians were disposing of securities, bonds, control of financial institutions, etc., to Germans at bargain prices.

LITHUANIAN "INDEPENDENCE".—Amsterdam, May 14.—Emperor William has issued a proclamation concerning Lithuania in which he says it is assumed Lithuania will participate in the war burdens of Germany. The

"independence" of Lithuania, allied with the German Empire, is recognized.

The proclamation, according to the *Rheinische Westfälische Zeitung*, carries the following preamble:

"We, Wilhelm, by God's grace, German Emperor, King of Prussia, etc., hereby make known that whereas the Lithuanian Landsrat, as the recognized representative of the Lithuanian people, on Dec. 12 announced the restoration of Lithuania as an independent state allied to the German Empire by an eternal, steadfast alliance, and by conventions chiefly regarding military matters, traffic, customs, and coinage, and solicited the help of the German Empire: and,

"*Whereas,* Further previous political connections in Lithuania are dissolved, we command our Imperial Chancellor to declare Lithuania on the basis of the aforementioned declarations of the Lithuanian Landsrat, in the name of the German Empire, as a free and independent state, and we are prepared to accord the Lithuanian State the solicited help and assistance in its restoration,

"We assume the conventions to be concluded will take the interests of the German Empire to account equally with those of Lithuania and that Lithuania will participate in the war burdens of Germany, which secured her liberation."

Washington, May 14.—Emperor William's proclamation was received to-day with no enthusiasm by officers at the Lithuanian National Council headquarters here.

"The assumption that Lithuania 'will participate in the war burdens of Germany' means a contribution of three things—money, munitions, and men," the officers declared. "The first we have not, as Germany has already impoverished us; the second we have no means of supplying, because we lack the first. Therefore Germany can have reference only to men. Men from a self-declared democracy to fight in the ranks of autocracy? Unthinkable! Lithuania would not consent. Are her citizens to be dragooned into the ranks of the Kaiser? That would be an abridgement of the sovereignty which Germany has already recognized, for Chancellor Hertling's reply stated, 'We hereby recognize Lithuania as free and independent.'"—*N. Y. Times*, 15/5.

REPUDIATES GERMAN RULE.—Washington, April 20.—The Provisional Government of Esthonia has published a protest against the recent German intrigue in that country, according to an official dispatch from France to-day, and has denounced the Diet of Livonia, Esthonia and Riga, which asked for a union with Prussia.

The protest is quoted by the dispatch in part as follows:

"As delegates of the Provisional Government of the Esthonian republic, we declare that the resolution is a falsification of the opinion of the Esthonian nation and can only be the expression of an insignificant minority composed of the German nobility and their partisans. The representatives of the Esthonian nation were not present at the assembly, having been replaced by substitutes of Esthonian origin, but deprived of all authority and not enjoying the confidence of the majority of the population, as well as by other elements and other persons introduced by the German military authorities."

The protest concludes, the dispatch said, with the assertion that the majority of the Esthonian nation would never submit to the decisions of the Diet of Riga, which it repudiates as worthless and illegal.—*Baltimore Sun*, 21/4.

LORD CECIL ON GERMAN PLANS.—London, May 3.—Lord Robert Cecil discussed to-day the expected German peace offensive, and said that he looked for it as part of their regular war plan.

"It will be meant mainly for internal consumption," he said. "Of course, it has proved futile to prophesy in this war, but I believe that the German

general plan is, supposing that they cannot win a decisive victory over the Allies, to go on fighting in the West until they have acquired complete commercial hold over the East. If they once really establish themselves in Russia, there is no reason why they should not fight the whole world forever."

Asked if he included in the German plans the use of Russia's man power, Lord Robert said that he did not expect that immediately, but it might come later. He went on to say that these grandiose plans depended on many things, and the German Government's great object in launching a peace offensive at this time was to induce its own people to carry on from week to week and month to month, in the belief that peace was almost in sight, until its Russian plans were matured. He continued:

"The peace offensive, I believe, will be directed very largely against England. They will put out offers which they think will be attractive to this country."

He then explained his idea of the German tactics. First, there was in the German newspapers a great outburst of Pan-Germanism, which was permitted, if not encouraged, by the government. Then, when the German peace offers are made, perhaps to England, they will be so much less than what the Pan-Germans have claimed that the government will be able to appeal to its people to admire its moderation. Meanwhile, in case something might come of its move, it has permitted the circulation of the Lichnowsky memorandum and has paid official tribute to the bravery of the British troops, to lessen the bitterness of feeling against England."—*N. Y. Times*, 4/5.

GERMANY OVERTHROWS UKRAINIAN RADA.—While events in Ukraine have not been fully reported, it appears that on April 25, the German authorities, under cover of a so-called revolt, dissolved the Ukrainian Central Rada, arrested and searched many members of the Rada and the Ukrainian Cabinet, and on the next day set up a new government completely under German control. This government was headed by a Russian named Skoropadski, who proclaimed himself "Hetman" with supreme power and formed a ministry of former bourgeois politicians favoring Germany as against the Bolsheviki. Skoropadski had formerly been a page to the Dowager Empress Marie Feodorovna, and it was later reported that she and the Grand Duke Dmitri Pavlovitch took part in the coup d'état and had arrived at Kiev. General von Eichorn, the German military authority, proclaimed military rule and continued arrests of those opposed to the new government.

Correspondents opposed to Bolshevik rule in Russia inclined to a favorable view of the patriotism of the new cabinet. On the other hand Mr. Arthur Ransome wrote on May 9 as follows:

"According to my information, Skoropadski, before the beginning of the negotiations with Great Russia, will invite her representatives to change the present government, meaning thereby probably not merely a change of persons but of the general political coloring of the ministry."

Should this be so, it will be yet another proof that the interests of the Allies coincide with those of the Soviet Government.

The official *Izvestia* says:

"Each new act of the German Government in connection with Russia merely deepens the gulf between Germany and her eastern neighbors. The German military party is preparing for itself irreconcilable enemies in the East and not making friends in the West."

I believe that is absolutely true, and that Germany, step by step, is increasing her own difficulties in Ukraine. The burgeois Rada, for example, had guaranteed by the peace agreement to supply 30,000,000 poods of corn to

the Central Powers before May 1. Owing to the passive and sometimes active resistance of the peasants they succeeded in only supplying 3,000,000. That is to say, that for the betrayal of the Russian revolution the German people so far have received less than 1 pound of flour all round.

Later lists of the ministers of the cabinet of the autocratic Hetman differ in detail from the list cabled Tuesday, but the main characteristic of all lists is the same. It is made up of cadets and members of political groups even further right. It is committed to a germanophile policy.

The German declaration asserts that the Rada had no base of popular support and no authority, since its was unable to free the banker Dobry, who was arrested by an anti-German society. The Germans promise to give all possible support to Skoropadski against revolts, which they evidently consider probable.—*N. Y. Times*, 11/5.

RUMANIAN PEACE TREATY

RUMANIAN PEACE TREATY SIGNED.—The peace treaty between Rumania and the Central Powers, to be called the "Peace of Bucharest," was signed on May 6. By the treaty Rumania concedes to Austria "frontier rectifications" requiring the cession of some 3000 square miles of territory on the Transylvanian border, control of the Danube by the Central Powers along its entire length, cession to Bulgaria of all the Dobrudja gained by the treaty of Bucharest in 1913, and German control over Rumanian oil fields.

A summary of the treaty follows:

Clause 1.—Re-establishment of Peace and Friendship.—Germany, Austria-Hungary, Bulgaria and Turkey, on the one hand, and Rumania on the other, declare the state of war ended and that the contracting parties are determined henceforth to live together in peace and friendship.

Diplomatic and consular relations between the contracting parties will be resumed immediately after the ratification of the peace treaty. The admission of consuls will be reserved for a future agreement.

The remaining clauses may be summarized as follows:

Clause 2.—Demobilization of the Rumanian Forces.—The Rumanian Army, except four divisions in Bessarabia, to be reduced to a peace basis; surplus munitions and guns to be guarded by Rumanian troops under supervision of the allied (German) command; naval forces to be reduced to a peace basis, after a settlement in Bessarabia, except as employed for river police and protection of navigation on the Black Sea.

Clauses 3-5.—Cessions of Territories.—Cession to Bulgaria of that part of Dobrudja taken from Bulgaria in 1913, and to the Central Powers of the remainder of Dobrudja to the St. George branch of the Danube mouth; frontier rectifications in favor of Austria as indicated on map; mutual renunciation of indemnities for war costs; an army of occupation at the expense of Rumania.

Clause 6.—Navigation on the Danube.—The Danube Commission to comprise only representatives of states situated on the Danube or the European coasts of the Black Sea, and to control the Danube from Braila downward. Rumania to guarantee free navigation of the Danube to ships of the other contracting parties.

The peace was hailed with joy in Germany as "The petroleum peace." "A land of bread and oil," said *Germania*, "will be provided for Central Europe.

BESSARABIA ANNEXED TO RUMANIA.—Washington, April 22.—The union of Bessarabia with Rumania is "definitive and indissoluble," according to information submitted to the State Department to-day by the Rumanian

Legation. The Rumanian Minister, Dr. Constantin Angelesco, has resigned, and the communication was delivered to the department by the Chargé d'Affaires, N. H. Lahovary, as follows:

"On April 9 the National Assembly of Bessarabia voted by 86 against 3 for union of Bessarabia to Rumania. The Rumanian Premier was then at Kishinov (capital of Bessarabia) and took cognizance of the vote amid enthusiastic acclamation and declared this union to be definitive and indissoluble.

"Bessarabian delegates went to Jassy on April 12 to present the homage of the people of Bessarabia to their Majesties the King and Queen of Rumania. A Te Deum was sung at the cathedral in the presence of the royal family, the government and the Bessarabian delegates.

Bessarabia, according to Mr. Lahovary, has about 3,000,000 inhabitants, and more than three-fourths of these are Rumanians. "Bessarabia," he continued, "is one of the richest farm lands of what was formerly Russia. The Bolsheviki ravaged it frightfully during the winter months, and the country was only saved by the Rumanian troops, who were called in by the Bessarabians. Because of this help the Bolsheviki declared war on Rumania, and there were violent clashes between the Bolshevist brigands and Rumanian troops. Finally the latter ousted the Bolsheviki and succeeded in restoring tranquillity, but only after the Bolsheviki had committed most frightful outrages and pillaged the country.

"If Rumania was obliged to make peace, it was due directly to the attitude of the Bolsheviki toward Rumania."—*N. Y. Times*, 23/4.

RUMANIA MUST SELL TO GERMANY.—Amsterdam, May 14.—A Vienna dispatch says that a special economic treaty between Rumania and the Central Empires provides that Rumania will sell to Germany and Austria-Hungary her surplus production in 1918 and 1919 of all kinds of grain, including oil, seeds, and also fodder, pulse, poultry, cattle, fibrous plants, and wool. Rumania also agrees to sell this surplus to the Central Powers for a further period of seven years, if it should be required.—*N. Y. Times*, 15/5.

FINLAND AND RUSSIA'S ARCTIC PORTS

GERMANY AND FINLAND.—The Stockholm correspondent of the London *Times*, writing on March 6, gives the following explanation of the situation in Finland. When Finland asserted her independence, Sweden and the Scandinavian states were the first to give recognition. At the same time, the Aland islanders demanded annexation by Sweden, and King Gustav gave every encouragement to this demand, seeing in Finland as a buffer state and the Aland Islands linked to Sweden, a realization of the aims of Swedish diplomacy.

When a "Red" or Bolshevik revolt broke out against the Finnish Republic, a strong appeal was sent to Sweden for help. Sweden refused, but offered mediation between the Red and White forces, which was accepted only by the Aland islanders. A small Swedish force was sent to the islands, and the Red and White armies agreed to evacuate and leave the disposition of the islands to the peace settlement.

In Finland itself, however, the government made little progress against the Reds. As a last resort an appeal was made to Germany, which at once sent a consignment of arms (Japanese rifles captured in Russia) and a strong naval expedition. The first measure of this force was to establish a base in the Aland Islands, Germany at the same time assuring Sweden that the future of the islands would be settled later by agreement among the

Baltic powers alone. Germany's advantage in the northern Baltic was thus secured through Sweden's policy of non-intervention.

CONTROL OF RUSSIA'S ARCTIC PORTS.—A Moscow dispatch of April 14 stated that 6000 allied troops had been landed at Murmansk to aid in protecting the railroads from the interior of Russia to the sea outlets on the northern coast. Germany, according to a dispatch of April 23, protested to Russia against this action, on the ground that it was a violation of the Brest-Litovsk treaty and that the presence of troops on the Finnish frontier threatened the safety of Finland.

During May, German papers dwelt on Great Britain's alleged plans to take possession of Kola Bay (the harbor of Murmansk), and Finnish Activist papers strongly advocated the conquest of Karelia and even the occupation of Petrograd.

A delayed dispatch from Moscow has revealed the fact that British and French troops have been landed on the Kola Peninsula to aid Russians in protecting the railroads from the interior of Russia to the two main sea outlets in the north—Murmansk and Archangel. Arrows on the above map point to Murmansk, on the Arctic Ocean, where the allied troops were landed and to Kem, where Finnish White Guards, attacking the railway line to Murmansk, were repulsed by the entente forces.—*Baltimore Sun*, 22/4.

ALLIED MEASURES IN THE FAR EAST

MILITARY AGREEMENT BY CHINA AND JAPAN.—Dispatches from China in April gave varied accounts of military negotiations between China and Japan. In the first issue of the Shanghai *Gazette* on April 24 it was stated that these demands were more serious than Japan's demands in 1915, and involved Japanese command of Chinese forces sent into Siberia, Japanese organization of Chinese police, Japanese control of arsenals and dockyards, and special privileges in mining, financial aid, and educational administration.

Washington, May 18.—Official information of the conclusion of a treaty between the Japanese and Chinese Governments for a defensive alliance against Germany has been received at the State Department from Paul S. Reinsch, the American Minister at Peking. Little is known of the details of the agreement, of which it is said generally that it was entered into for the purpose of mutual protection for the duration of the great war.

Although it is not known whether the United States and other allied governments were consulted, it would be a mistake to say that they were not informed of the negotiations of the treaty, which probably marks the beginning of a far-reaching policy that may lead to allied action designed to check the free hand which Germany has assumed in Russia.

While apparently intended primarily to provide against Bolshevist aggressions in Manchuria and other menacing activities of the present ruling faction in Russian territory, the treaty makers are supposed to have had an eye to possible German advance into Siberia through propagandist methods.—*N. Y. Times*, 19/5.

JAPAN AND UNITED STATES IN CONCERT.—Tokio dispatches of April 24, announced the resignation of Viscount Motono, Japanese Minister of Foreign Affairs, and the appointment in his place of Baron Goto. It was stated that the resignation resulted from the arrival in Tokio of the Japanese Ambassador to Russia, Baron Uchida, who opposed a campaign in Siberia and was supported by the Premier.

Baron Goto dispatched to Secretary Lansing a message, appearing in the press on May 8, as follows:

Charged with the direction of foreign affairs in this ministry, owing to the regrettable illness and retirement of Viscount Motono, I need hardly assure you of as firm a determination as ever of this government to promote and cement in every possible way the relations of mutual regard and confidence between our two nations, holding implicit faith in the final victory of our common cause to which we are unalterably committed. I am indeed proud of the privilege that is afforded me of associating myself with you in the great task before us.

Secretary Lansing's reply, also made public at the State Department to-day, follows in part:

I have read with gratification your telegram of yesterday, which expresses so frankly the spirit of goodwill for this country and of devotion to the common cause to which we are pledged.

It is needless to assure your Excellency that your words of confidence and esteem are fully reciprocated by this government. Candor and friendship in all our relations are our supreme wish and purpose; and we feel confident that, guided by this spirit, the United States and Japan will enjoy an even better understanding—if that is possible—than the understanding which today characterizes their intercourse.

UNITED STATES SUPPORTS CONSUL AT VLADIVOSTOK.—It was announced on April 26 that M. Tchitcherin, Russian Foreign Minister had requested the United States, Great Britain, and France to remove their consuls at Vladivostok as a result of alleged improper negotiations with the Siberian autonomous government and support of the counter-revolutionary movement. A protest was also addressed to Japan. This protest was concident with the arrival in Moscow of the German Ambassador, Count von Mirbach. It was regarded by the Allies as a device to force recognition of the Soviet Government.

Secretary Lansing received the protest on May 6, and on May 9 instructed Ambassador Francis to communicate informally a denial of the charges. Ambassador Francis had previously acted in the matter, as indicated by the following Moscow dispatch of April 28:

The Bolshevist demands on Ambassador Francis were: First, the removal of John K. Caldwell, American Consul at Vladivostok; second, investigation of his part in the alleged negotiations with the American Legation at Peking, and third, the attitude of the American Government toward the Soviet republic.

Ambassador Francis has sent a communication to the Bolshevist Government regarding the alleged participation of Americans, French, and British in a Siberian counter-revolt plot in connection with which the Bolsheviki put plainly the question of the recognition of their government. The American Embassy, the note says, carefully scrutinized the documents submitted by the Russian Government. In the American viewpoint, the documents failed to show any connection of American officials in these plots.

The American Embassy, the Ambassador continues, interprets the documents to show only that persons planning a counterrevolt contemplated asking the assistance of Consul Caldwell, Admiral Knight, and the representatives of the Allies in Peking, including the American Minister, but failed to show either the consummation of the hopes of the revolutonaries in this direction, or that the Americans participated or promised aid in any way. It is deemed unfortunate, in the present state of Russian international relations, that such flimsy charges should arise.

Official denial has been made by Japanese Consul Uyeda to the Russian Foreign Office to rumors that the Japanese are placing machine-guns in Vladivostok and are arranging to increase their forces there.—*N. Y. Times*, 5/7.

HOLLAND UNDER GERMAN PRESSURE

In October, 1917, Great Britain protested to Holland against Germany's use of Dutch canals to transport sand and gravel to Belgium, and also copper to be smelted in Belgium. It was contested that Germany's occupation of Belgium was for strictly military purposes, and that the sand and gravel were used for purposes of fortification. In July, 1916, Holland had restricted such transportation to 75,000 tons per month, but this was later increased to 450,000 tons per month.

HOLLAND—THE "NATURAL PROPERTY OF THE GERMAN EMPIRE."

So German Imperialists believe, because the mouths of the Rhine are in Holland; also an irksome wedge of Netherland soil in the south divides Belgium from Germany.

—*Literary Digest*, 11/5.

In April, 1918, following the allied seizure of Dutch ships, Germany renewed her pressure on Holland, demanding not only extension of the sand and gravel agreement but also the privilege of sending supplies over the Limburg railway to Antwerp. This demand was put practically in the form of an ultimatum, and Foreign Minister Loudon on April 25 declared the situation very serious. However, on May 5, Jonkheer Loudon announced that the tension was ended and that Holland had agreed to the transport of 1,600,000 tons of sand and gravel per annum for Belgian roads, without supervision of the use of such materials.

Explaining the strained relations on May 10, Foreign Minister Loudon said:

"The government's reasons for considering the relations which had arisen with Germany as strained lay in the emphasis with which the German Government made known what it demanded from the Dutch Government, some

parts of which demands were immediately seen to be unacceptable. Through her minister here, Germany gave both the Dutch Premier and the Minister of Foreign Affairs to understand that it was a matter which had not been decided without thorough consideration and must be accepted in its entirety as an irreducible minimum.

"The Dutch Minister at Berlin, in particular, was clearly told that if the German demands were not granted the consequences would be most serious for Holland.

"The question of the transit of sand and gravel had been regulated in a manner which encountered no fundamental objections on the part of the Dutch Government. On the other hand, the character of the goods to be transported over the Limburg Railway was in direct conflict with the actual wording of the Dutch proclamation of neutrality. The government decided, therefore, unhesitatingly to oppose this. It was only when the German Government had accepted transport of provisions for the army as the fourth exception, and had agreed to the description of the term 'arms' in accordance with the Dutch conception, that the Dutch Government could drop its objections."

The minister said he was sufficiently convinced that the arrangements now made with Germany respecting the transit, especially of sand and gravel, would not lead to the allied governments putting fresh difficulties in Holland's way. He had informed the British and French Governments of the difficulties which had arisen with Germany, although it was not for a moment a request for their approval.

"These governments," he continued "showed that they fully understood the seriousness of Holland's position. By a joint step taken by their ministers here, who were accompanied by their colleagues of America and Italy, they informed us that for this reason alone, but with absolute maintenance of their standpoint as regards the principle, they would place no difficulties in the way of the Dutch Government in the matter of the arrangements made."—*N. Y. Times*, 12/5.

GREAT BRITAIN DEFENDS SHIP SEIZURES.—London, May 1.—The note of the British Government in reply to the last Dutch note concerning the requisitioning of Dutch shipping gives a detailed survey of the abortive negotiations for an amicable arrangement for the use of Dutch shipping.

The note deals with the allegation of the Netherlands Government that the measure taken only rests on force and contends that the measure taken was simply an exercise of the universally recognized right of sovereignty.

The note concludes with an expression of the hope that the explanations given will remove from the mind of the Netherlands Government and the Dutch people any misconceptions regarding the proceedings of the associated governments, and that it will be realized that the latter have done everything in their power to render the action they were compelled to take, and which, in their opinion, is fully justified under international law, as little injurious as possible to the Netherlands interests.—*Washington Star*, 3/5.

GREAT BRITAIN

LLOYD GEORGE OVERCOMES ARMY OPPOSITION.—A political sensation, rather than a ministerial crisis, arose in England over a letter published in the London *Chronicle* of May 6 by General Maurice, former Director of Military Operations. From this office, which is in reality simply the link between the commanders in the field and the war cabinet, General Maurice had been removed several days before for an indiscreet and unjustified criticism of alleged French failure to support the British forces, in which Haig was compared to Wellington waiting for Blücher at Waterloo. The letter follows:

To the Editor of The Daily Chronicle:

My attention has been called to answers given in the House of Commons on April 23 by Mr. Bonar Law to questions put by R. C. Lambert, Colonel C. R. Burn, and W. M. R. Pringle as to the extension of the British front in France. Those answers contain certain misstatements which, in sum, give a totally misleading impression of what occurred. This is not the place to enter into a discussion as to all the facts, but Hansard's report concludes:

"Mr. Pringle—Was this matter entered into at the Versailles War Council at any time?

"Mr. Bonar Law—That particular question was not dealt with at all by the Versailles War Council."

I was at Versailles when the question was decided by the Supreme War Council, to whom it had been referred.

This is the latest of a series of misstatements which have been made recently in the House of Commons by the present government. On April 9 the Prime Minister said:

"What was the position at the beginning of the battle? Notwithstanding the heavy casualties in 1917, the army in France was considerably stronger on Jan. 1, 1918, than on Jan. 1, 1917. (Hansard, Vol. 104, No. 24, p. 1328.)"

That statement implies that Sir Douglas Haig's fighting strength on the eve of the great battle which began March 21 had not been diminished. This is not correct. Again in the same speech the Prime Minister said:

"In Mesopotamia there is only one white division at all, and in Egypt and Palestine there are only three white divisions. The rest are either Indians or mixed with a very small proportion of British troops in these divisions. I am referring to infantry divisions, Ibid., p. 1327."

This is not correct.

Now, Sir, this letter is not the result of a military conspiracy. It has been seen by no soldier. I am by descent and conviction as sincere a democrat as the Prime Minister, and the last thing I desire is to see the government of our country in the hands of soldiers.

My reasons for taking the very grave step of writing this letter are that the statements quoted above are known to a large number of soldiers to be incorrect, and this knowledge is breeding such a distrust of the government as can only end in impairing the splendid morale of our troops at a time when everything possible should be done to raise it. I have therefore decided, fully realizing the consequences to myself, that my duty as a citizen must override my duty as a soldier, and I ask you to publish this letter in the hope that Parliament may see fit to order an investigation into the statements I have made. I am, Sir, yours, faithfully,

F. MAURICE, Major General.

20 Kensington Park Gardens, May 6, 1918.

On May 7 Mr. Bonar Law announced in the House of Commons that the government proposed to ask two judges to act as a court to investigate the charges immediately. Mr. Asquith, leader of the opposition, offered on the day following a motion that the investigation be made by a Parliamentary Committee. To this the government objected on the ground of avoiding publicity and a prejudiced decision, and Mr. Lloyd George made an effective speech supporting the accuracy of his statements. The Asquith resolution was voted down by a majority of 293 to 106.

General Maurice was retired from the army and afterward accepted the position of military critic for the London *Daily Chronicle*.

GOVERNMENT ARRESTS SINN FEINERS.—London, May 18.—Five hundred Sinn Feiners were arrested at various towns in Ireland to-day, according to a Dublin dispatch to *The Evening News*.

"There have been no disturbances anywhere in the country, as far as is known here," says the dispatch. "Indeed, the most striking feature of the government's coup was its swiftness and thoroughness. All arrangements were carried through like clockwork, dumfounding the Sinn Feiners who boasted that the authorities were afraid to arrest Professor de Valera or any other leaders, and would meddle only with the smaller fry of the organization."

In no case, says the dispatch, was resistance offered to the police and soldiers who made the arrests. The Dublin offices of the Sinn Fein and the offices of the National Aid Fund were taken over by the military.

All the Sinn Fein members of Parliament have been arrested.

Dublin remains quiet, the correspondent adds, but there is a feeling of suppressed excitement.

Documents of great importance in connection with an Irish conspiracy have fallen into the hands of the government through the arrest by coast guards of a man with certain evidence upon him.—*N. Y. Times,* 19/5.

SPAIN

Upon the resignation of the Prieto Cabinet in Spain for the third and as it turned out last time on March 19, a period of confusion ensued in which no party leader would attempt to form a government. As a last resort, an "all star" combination was formed including Maura, Dato, Romanonis, Cambo, and Alba. It remains to be seen how this "regiment of generals" will work together.

The crisis which brought about the government downfall arose over the attempt of telegraph and postal employes to form a junta such as had been used with success by the army, and "hold up" the government for a sum of $750,000 within 24 hours. The government put the two services under military control and operation, with the result that both services fell into almost hopeless confusion.—Condensed from *Philadelphia Public Ledger,* 21/4.

LATIN-AMERICA

NICARAGUA AND GUATEMALA IN THE WAR.—Guatemala City, April 22.—The National Assembly at its session to-day declared the Republic of Guatemala to occupy the same position toward the European belligerents as does the United States. Guatemala broke off diplomatic relations with Germany in April, 1917.

San Juan Del Sur, Nicaragua, May 7.—Nicaragua to-day declared war on Germany and her allies. The declaration of war was adopted by Congress at the suggestion of President Chamorro, with only four dissenting votes.

Congress also adopted a declaration of solidarity with the United States and the other American republics at war with Germany and Austria, and authorized the President to take steps for utilization to a full measure of the nation's forces in the war.

Nicaragua is the twentieth nation which has declared war against Germany.—*N. Y. Times,* 8/5.

GUATEMALA-HONDURAS BOUNDARY ARBITRATION.—The special missions appointed by Guatemala and Honduras to settle the boundary controversy that has existed between the two countries for many years will arrive in Washington in a few days to begin their conferences through the mediation of the United States, the State Department announced to-day.

In January of this year, the United States Government suggested that each appoint a special plenipotentiary to proceed to the United States and settle the boundary dispute. Guatemala asked the United States to act as mediator. —*N. Y. Herald,* 28/4.

URUGUAY PUZZLED.—According to a statement from Montevideo on May 16, Germany had sent a message informing Uruguay that a state of war did not exist between the two countries. Uruguay's uncertainty arose from the action of a German submarine commander who took a Uruguayan military commission off a Spanish vessel and required pledges before allowing the commission to proceed.

Germany later relieved the commissioners of their pledges, but requested aid in securing passage across French territory of a Chilean mission to Germany. In response to an inquiry, Chile informed Uruguay that she had no desire that this mission should reach its destination.

U. S. IMPORTS FURTHER RESTRICTED

By order of the War Trade Board issued May 14, no licenses for imports to the United States may be granted by our consuls abroad until these licenses have been approved by the War Trade Board. The object of this measure is to prevent unnecessary shipments and to "give the War Trade Board an opportunity of passing upon all importations from a standpoint of enemy trade connection before shipments are put in transit."

REVIEW OF BOOKS

ON

SUBJECTS OF PROFESSIONAL INTEREST

"Field Artillery Officer's Notes." By Caldwell and Danford. $1.50 net. (New York: E. P. Dutton and Company.)

This notebook contains a considerable amount of important information relating to the administration, organization, transport, training and employment of field artillery.

The text is arranged to facilitate ready and convenient reference, and tables and formulæ have been included to facilitate the computation of firing data.

The methods employed to lay the guns by means of the map and compass are considered in much greater detail than is given to the subject in the Provisional Field Artillery Regulations, 1916, and it appears that the text follows to a considerable extent the methods employed by artillery in Europe in the present war.

With reference to the tables it is noted that in some cases the print is too fine, and in others, notably the table on page 67, the figures are too indistinct for convenience. Effort has apparently been made to crowd the tables, to accommodate one to the page, which is unfortunate; the type should be bold and distinct and easily readable even in a poor light. For this reason the tables should be given as much room as they require.

The form and size of the Note Book is also inconvenient to carry in the blouse pocket, and should be modified to make it handy for this purpose.

This book does not replace the Field Artillery Regulations; in fact there is no claim that it does. A thorough knowledge of the artillery regulations is necessary in any event, and the note book will be most useful to those officers who are familiar with the regulations. Young officers, particularly those who are inexperienced, are too prone to take for granted that a condensed book, such as the Field Note Book, contains all needful information on the subject. W. P. U.

"Manual for the Use of Troops in Aid of the Civil Authority." By Babcock. Price $1.00 net. (New York: George H. Doran Company.)

This manual has been prepared specifically for use by the National Guard of New York State. Apparently all laws and statutes relating to the subject have been included, and several extracts from the Army Regulations also appear.

A considerable part of the manual relates to the provisions of the Penal Law and Code of Criminal Procedure, the laws of New York relating to the employment of the National Guard in aid of the Civil Authorities, and compensation and pensions; and consequently these provisions are for the

most part without authority as far as their employment by Federal troops, or the National Guards of other states is concerned.

Probably little relating to the tactical employment of troops on riot duty, not already known to well-informed officers, is contained in the manual.

The psychology of mobs, or mob spirit, which is a matter of considerable importance and should receive some consideration in any work relating to riot duty, has not been covered.

The book, like a number of others on the subject, prescribes that the bayonet should be used as a weapon in handling mobs, particularly during the early stages of a revolt. As a matter of fact it is a bad policy for infantry to come to close quarters with a mob. Unless in force they immediately lose the advantage that their discipline, arms and training give them, and could in many cases be overcome and disarmed by the mob. Cavalry is the arm for close contact with mobs, when it is necessary to come to grips with them.

The danger from the employment of explosives by rioters has been well emphasized in the text, but with regard to automobiles it would not appear that they are of special menace. Rioters as a rule do not own or control automobiles, and are seldom well organized enough to seize them in quantities. Motor cars, however, would be of considerable advantage to the troops and greatly extend their field of usefulness.

In general, while this book may appear to contain a number of unnecessary details and other irrelevant matter, a careful reading of the text will give a broadened grasp of the subject that is of value, particularly in the relations of the military with the civil authorities. W. P. U.

"Secrets of the Submarine." By Marley Frothingham Hay. Price $1.25 net. (New York: Dodd, Mead and Company.)

The author's purpose to write a book "for the benefit of the general public and in language which all could understand," has been very well carried out. He has described submarines, their operation, safety devices, etc., in non-technical terms entirely, and they can be easily understood even by a person whose only idea of a submarine is that it is a cigar-shaped object that goes under water and blows up ships. While written primarily for the layman, it will be of great interest to the naval service, especially the chapter "Sphere of the Submarine," which deals with the effect of the submarine on naval policies. The chapter "Submarine Antidotes" is also very interesting and will enlighten those who do not understand why naval operations against submarines, both at their bases and on the high seas, are not entirely successful. R. C. N.

"Health for the Soldier and Sailor." By Fisher and Fisk. (New York: Funk and Wagnalls Company.)

Thinking men of the country, realizing how human life was wasted by being unnecessarily cut short in peace times by ignorance and vicious modes of living, got together and evolved the Life Extension Institute, the principles of which, evolved and put into effect by medical and scientific men

for peace times, are now found to be far more important in war times. Never before in the history of the world has the maintenance of health been of so much importance, for now it means the conservation of energy expressed in man-power to be expended for the preservation of liberty and civilization, as the Allies understand it and are banded together to maintain it. In this book, "Health for Soldiers and Sailors," the authors, Fisher and Fisk, who are both representatives of the Life Extension Institute, have given a short and concise study of hygiene and its application to war conditions. In this they have been aided by members of the Hygiene Reference Board, which is composed of men at the top of their professions—it is the last word on the subject of health for our fighting men. The book is a veritable *multum in parvo*. From its size one would think that the subjects are only touched upon, but after reading it one is impressed with the amount of knowledge he has gained, and if he has the wisdom to make use of it, the days of the soldier and sailor will be happier and longer and far more useful to his country. Each subject treated should be emphasized, whether the habits of the man, the air he breathes, the food he eats, the water he drinks, or the poisons he should avoid. Special emphasis should be laid on the avoidance of the venereal peril. The damage from this peril is so real and so far-reaching, and has always been such a menace to the health of soldiers and sailors that they ought to know about it and fight it with all that is good and strong and self-respecting in them. Too much cannot be said to enlighten them on the subject of venereal diseases, for the subject is of vast importance in its bearings, whether social, economic or the conservation of man-power at this critical time. The book is an epitome, but is still further boiled down into fifteen Rules of Hygiene—it is worth knowing these for use in our daily lives. A. M. D. McC.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-fifth year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be two dollars and fifty cents, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly; subscription for non-members, $3.00; enlisted men, U. S. Navy, $2.50. Single copies, by purchase, 30 cents; issues preceding January, 1918, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1919

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best essay on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the essay.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All essays published in the PROCEEDINGS during 1918, which are deemed by the Board of Control to be of sufficient merit, will be passed upon by the Board during the month of January, 1919, and the award for the prize will be made by the Board of Control, voting by ballot.

2. No essay received after November 1 will be available for publication in 1918. Essays received subsequent to November 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best essay published during 1918 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute. the actual amounts of the awards to be decided by the Board of Control in each case.

5. Essays are limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

6. It is requested that all essays be submitted typewritten and in duplicate; essays submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

G. M. RAVENSCROFT,
Lieut. Commander, U. S. N., Secretary and Treasurer.

TOPICS FOR ESSAYS

SUGGESTED BY REQUEST OF THE BOARD OF CONTROL

"Duties and Responsibilities of Subordinates with Special Reference to the Relations between Commanders-in-Chief and Chief of Naval Operations; Commanders-in-Chief and Force Commanders; Force Commanders and Division Commanders."

"Initiative of the Subordinate—Its True Meaning."

"Military Efficiency Dependent upon National Discipline."

"Governmental Organization for War."

"Naval Gunnery, Now and of the Future."

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"Moral Preparedness."

"Tact in Relation to Discipline."

"The Principles of Naval Administration in Support of War-Time Operations."

"What Steps in Organization and Training Should be Taken to Maintain and Increase the Efficiency of the Navy at the Close of the Present War."

"Responsibilities and Duties of Naval and Military Officers of the United States in Educating and Informing the Public on Professional Matters."

"A Commission in The Navy: Its Meaning and the Obligations Which It Involves."

"The Relations of an Officer to his Subordinate, Both Commissioned and Enlisted."

"The True Meaning of the Expression 'An Officer and a Gentleman.'"

LIST OF PRIZE ESSAYS

"WHAT THE NAVY HAS BEEN THINKING ABOUT"

1879

Naval Education. Prize Essay, 1879. By Lieut. Commander A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut. Commander C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser Best Suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of Its Decline and the Means to Be Taken for Its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut. Commander F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How May the Sphere of Usefulness of Naval Officers Be Extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill Are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: Its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut. Commander W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for Our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: Their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U. S. S. Vesuvius, with Special Reference to Her Pneumatic Battery. Prize Essay, 1894. By Lieut. Commander Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut. Commander Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention 1896. By Lieutenant John M. Ellicott, U. S. N.

1897

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut. Commander Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of Its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure Its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize Essay, 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear Admiral Stephen B. Luce, U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut. Commander A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906. By Pay Inspector J. A. Mudd, U. S. N.

1907

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A Few Thoughts on Our Next Step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut. Commander Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

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A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENCE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle? Second Honorable Mention, 1908. By Lieut. Commander Yates Stirling, U. S. N.

1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

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The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotton, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

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Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut. Commander T. D. Parker, U. S. N.

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The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut. Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A Study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut. Commander Dudley W. Knox, U. S. N.

1914

The Great Lesson from Nelson for To-day. Prize Essay, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. N.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. N.

1915

The Rôle of Doctrine in Naval Warfare. Prize Essay, 1915. By Lieut. Commander Dudley W. Knox, U. S. N.

AN AIR FLEET: OUR PRESSING NAVAL WANT. First Honorable Mention, 1915. By Lieut. Commander Thomas Drayton Parker, U. S. N.

TACTICS. Second Honorable Mention, 1915. By Ensign H. H. Frost, U. S. N.

DEFENCE AGAINST SURPRISE TORPEDO ATTACK. Third Honorable Mention, 1915. By Ensign R. T. Merrill, 2d, U. S. N.

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The Moral Factor in War. Prize Essay, 1916. By Lieutenant (J. G.) H. H. Frost, U. S. N.

NAVAL PERSONNEL. First Honorable Mention, 1916. By Lieut. Commander J. K. Taussig, U. S. N.

EDUCATION AT THE U. S. NAVAL ACADEMY. Second Honorable Mention, 1916. By Lieutenant Ridgely Hunt, U. S. N.

SOME UNDERLYING PRINCIPLES OF MORALE. Third Honorable Mention, 1916. By Commander Dudley W. Knox, U. S. N.

LARGE *vs.* A GREATER NUMBER OF SMALLER BATTLESHIPS. Lippincott Prize Essay. By Lieut. Commander Thomas Lee Johnson, U. S. N.

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Commerce Destroying in War. Prize Essay, 1917. By Commander Lyman A. Cotten, U. S. Navy.

THE PEOPLE'S RÔLE IN WAR. First Honorable Mention, 1917. By Lieutenant H. H. Frost, U. S. Navy.

THE NATION'S GREATEST NEED. Second Honorable Mention, 1917. By Colonel Dion Williams, U. S. Marine Corps.

1918

Letters on Naval Tactics. Prize Essay, 1918. By Lieutenant H. H. Frost, U. S. N.

THE PREPAREDNESS OF THE FUTURE. First Honorable mention, 1918. By Commander H. O. Rittenhouse, U. S. N. Retired.

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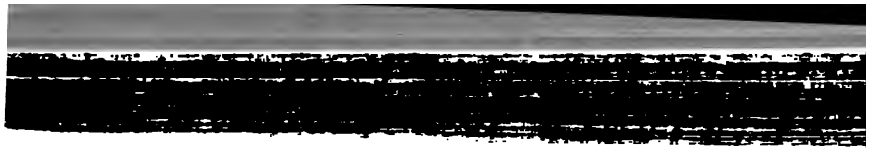

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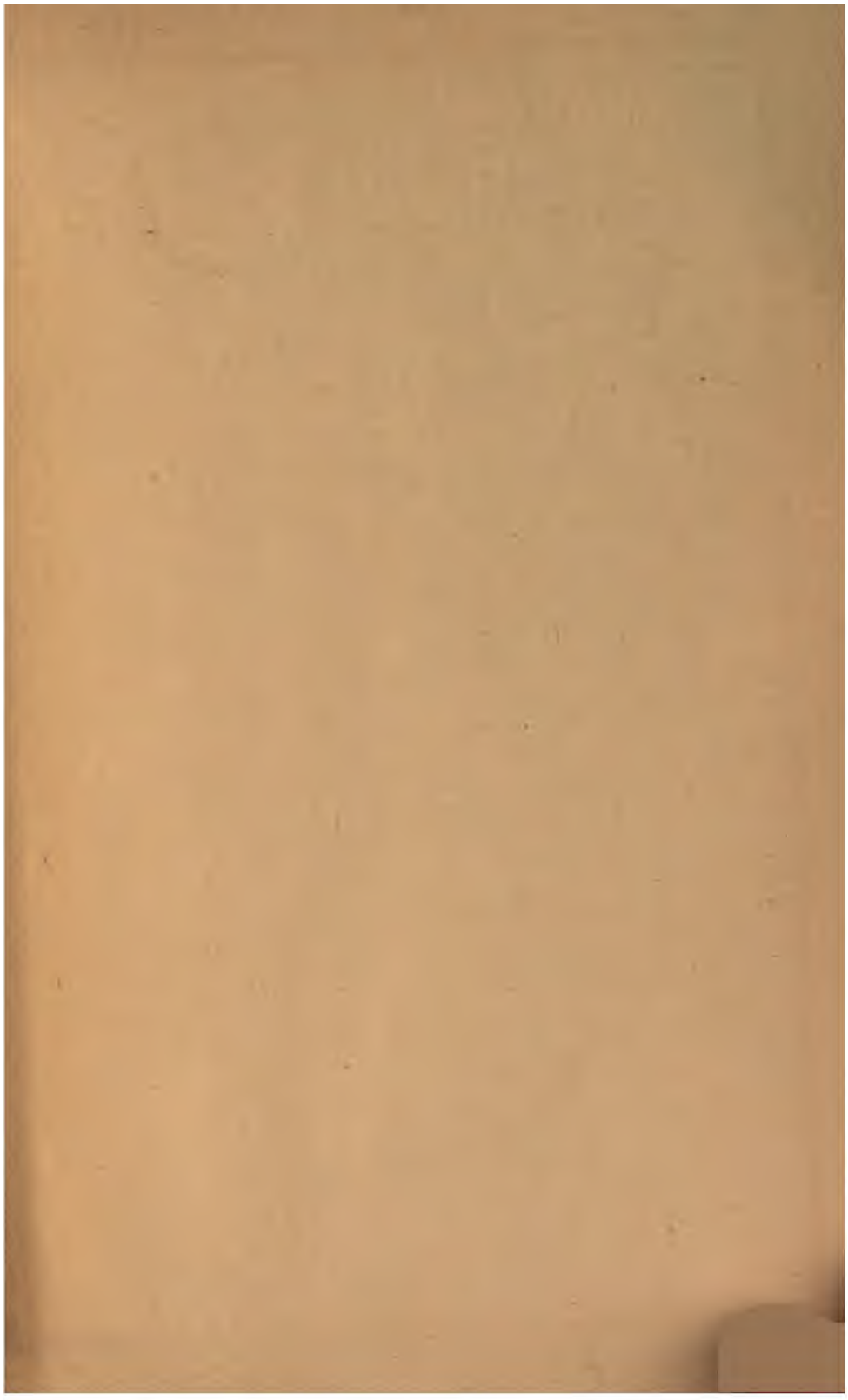
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